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LLOYD'S NATURAL HISTORY.

EDITED BY R. BOWDLER SHARPE, LL.D., F.L.S., &c.

A HAND-BOOK

TO THE

ORDER

LEPIDOPTERA.

BY

W. F. KIRBY, F.L.S., F.ENT.S.

DEPARTMENT OF ZOOLOGY, BRITISH MUSEUM.

Author of "A Synonymic Catalogue of Diurnal Lepidoptera," "European Butterflies and Moths," "A Text-book of Entomology," etc., etc.

PART I.

BUTTERFLIES.—VOL. I.

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PREFACE.

THE plan of the original "Naturalist's Library" has not been followed in the present volume, as it seemed to me better, in the case of the Lepidoptera, not to separate the British species from the exotic forms. Although numerous works on British Insects have been published, there is none, I believe, exactly on the plan of the present volume, where our native species of Butterflies are described and figured, and at the same time a review of their exotic relatives is attempted.

No one more fitted for the task of writing such a review could have been found than Mr. Kirby, whose "Synonymic Catalogue of Diurnal Lepidoptera" is recognised as a standard book of reference; and the pains he has taken in the preparation of the present Hand-book of the Lepidoptera will, I trust, be the means of presenting to the public one more of those useful essays on Entomology, with which his name has been associated for the last thirty years.

Some new plates have been added to the series published in the former issue of the "Naturalist's Library," in order to render the explanation of the different exotic genera more complete.

The woodcuts in the text are taken from Newman's well-known work on British Butterflies.

R. BOWDLER SHARPE.

AUTHOR'S PREFACE.

WHEN my friend Dr. Bowdler Sharpe invited me to write the Entomological part of the new "Naturalist's Library," the question of the best arrangement to adopt, exercised me considerably, in view of the large number of books on the more popular orders of insects which are continually issuing from the press. I had to try and invent a new scheme which was likely to be useful both to beginners and to more advanced Entomologists.

In the old "Naturalist's Library" there was a volume of British and a volume of foreign Butterflies, but I at once abandoned the idea of adding another to the host of books on British Butterflies alone, while at the same time it was desirable to use the plates of the old "Jardine" series. I therefore determined to combine these two volumes in such a manner as to make the British Butterflies illustrate and lead up to a study of the Butterflies of the World. I have also added as much popular information, not always to be found in professedly popular books, as I could reasonably introduce. To illustrate the foreign Butterflies, a few new plates have been added, chiefly representing recently described and hitherto unfigured species.

In the synonymy I have referred to the original description, and at least one good old, or typical, figure of each species; and to the works of Stephens, Curtis, and Barrett for British species, Kirby and Lang for European species, and Buckler

for British larvæ and pupæ. Of course this part of the work might have been enlarged to any extent, but probably most of my readers will think that I have devoted quite enough space to synonymy.

The Introduction deals with the general external structure of Lepidopterous insects and especially Butterflies in their various stages; special attention being given to neuration, collecting and preserving, and geographical distribution. I have also reprinted from the "Entomologist" a very interesting paper on the habits of insects, especially *Lepidoptera*, in the Dutch East Indies.

The present volume is devoted to the great family *Nymphalidæ*, which, with its sub-divisions, includes about half the known Butterflies; the next volume will contain the remaining families, and will thus complete the subject, so far as the Butterflies are concerned.

It is perhaps as well to state that the volumes on Entomology in the old issue of the "Naturalist's Library" were all written by James Duncan, of Edinburgh. Prof. Westwood contributed figures and information to some of the other volumes (see "Entomologist's Monthly Magazine," vol. xxi., pp. 181–186), but not to those on British and Exotic Butterflies.

W. F. KIRBY.

SYSTEMATIC INDEX.

ORDER LEPIDOPTERA 1

A. LEPIDOPTERA RHOPALOCERA 1

FAMILY NYMPHALIDÆ 10

SUB-FAMILY I. DANAINÆ 11

Genus HESTIA, Hübn. 13

H. lyncea (Drury) 13

H. idea (Clerck) 15

Genus IDEOPSIS, Horsf. and Moore 15

I. daos, Boisd. 15

Genus LIMNAS, Hübn. 16

L. chrysippus (L.) 16

Genus DANAUS, Latr. 18

D. plexippus (L.) 19

Genus TIRUMALA, Moore 20

T. limniace (Cram.) 20

Genus AMAURIS, Hübn. 21

A. niavius (L.) 21

Genus NEBRODA, Moore 22

N. lobengula, E. M. Sharpe 22

Genus EUPLŒA, Fabr. 23

E. corus, Fabr. 23

Genus HIRDAPA, Moore 24

H. rezia, Kirby 25

PAGE

Genus TELLERVO, Kirby 28
T. zoilus (Fabr.) 28
T. misoriensis (Staud.) 28
SUB-FAMILY II. ITHOMIINÆ 29
Genus ITHOMIA, Hübn. 30
I. doto, Hübn. 31
I. drymo, Hübn. 31
I. diaphana (Drury) 32
I. flora (Cram.) 32
SUB-FAMILY III. ACRÆINÆ 32
Genus ACRÆA, Fabr. 34
A. horta (L.) 34
A. œnone, Kirby 36
Genus GNESIA, Doubl. 37
G. circeis (Drury) 37
G. medea (Cram.) 38
Genus ACTINOTE, Hübn. 38
A. thalia (L.) 39
A. sodalis, Butler 40
SUB-FAMILY HELICONIINÆ 40
Genus HELICONIUS, Latr. 41
H. melpomene (L.) 42
SUB-FAMILY NYMPHALINÆ 43
Genus METAMORPHA, Hübn. 46
M. dido (Johanss.) 47
Genus CETHOSIA, Fabr. 48
C. mahratta, Moore 49
Genus CYNTHIA, Fabr. 50
C. arsinoe (Cram.) 50
C. juliana (Cram.) 51
Genus ARGYNNIS, Fabr. 52
A. paphia (L.) 55
α. A. valesina (Esper) 55
A. aglaia (L.) 57

PAGE

Genus ARGYNNIS (*continued*).
A. adippe (L.) 58
α. A. cleodoxa (Ochsenh.) 60
β. A. chlorodippe, H. S. 60
A. niobe (L.) 61
α. A. eris, Meigen 62
A. lathonia (L.) 63
Genus BRENTHIS, Hübn. 64
B. euphrosyne (L.) 65
B. selene (Denis and Schiff.) 66
B. dia (L.) 68
Genus Melitæa, Fabr. 73
M. aurinia (Rott.) 75
M. cinxia (L.) 76
M. athalia (Rott.) 78
M. pyronia (Hübn.) 80
Genus ARASCHNIA, Hübn. 82
A. levana (L.) 83
Genus POLYGONIA, Hübn. 86
P. c.-album (L.) 87
Genus VANESSA, Fabr. 88
V. polychlorus (L.) 89
V. urticæ (L.) 90
V. antiopa (L.) 92
V. io (L.) 95
Genus PYRAMEIS, Hübn. 96
P. atalanta (L.) 97
P. cardui (L.) 98
Genus JUNONIA, Hübn. 101
J. orthosia (Godart) 102
Genus KALLIMA, Westw. 105
K. huttoni, Moore 106
Genus ANARTIA, Hübn. 108
A. amalthea (L.) 109
Genus ERGOLIS 109

PAGE

Genus CATAGRAMMA, Boisd. 115
C. pygas (Godart) 116
C. astarte (Cram.) 117
Genus HÆMATERA, Doubl. 120
H. pyramus (Fabr.) 120
Genus GYNÆCIA, Doubl. 122
Genus HYPOLIMNAS, Hübn. 123
Genus AGERONIA, Hübn. 130
A. arethusa (Cram.) 132
A. amphinome (L.) 134
Genus MARPESIA, Hübn. 137
M. peleus (Sulz.) 138
Genus LIMENITIS, Fabr. 141
L. camilla (Linn.) 142
L. drusilla (Bergstr.) 146
Genus NEPTIS, Fabr. 146
N. aceris (Lep.) 146
N. nicomedes, Hewits. 147
SUB-FAMILY VI. APATURINÆ 159
Genus APATURA, Fabr. 160
A. iris (Linn.) 163
α. A. iole (Denis and Schiff.) 164
Genus THALEROPIS, Staud. 166
T. ionia (Eversm.) 167
Genus PROTOGONIUS, Hübn. 170
P. fabius (Cram.) 171
Genus AGANISTHUS 175
Genus CHARAXES, Ochsenh. 177
C. jasius (L.) 179
C. xiphares (Cram.) 182
C. tiridates (Cram.) 184
C. etheocles (Cram.) 185
SUB-FAMILY VII. MORPHINÆ 193

PAGE

Genus MORPHO, Fabr. 194
M. adonis (Cram.) 195
M. achilles (L.) 195

SUB-FAMILY VIII. BRASSOLINÆ 199

Genus CALIGO, Hübn. 200
C. eurylochus (Cram.) 200
C. ilioneus (Cram.)... 201

SUB-FAMILY SATYRINÆ 201

I. HETÆRA Group... 205
Genus PIERELLA, Westw.... 205
P. ceryce, Hewits. 206
II. LETHE Group 206
Genus PARARGE, Hübn. 207
P. egerides, Staud.... 208
α. P. egerides, Staud. 208
β. P. egeria (L.) 208
Genus SATYRUS, Latr. 209
S. megæra (L.) 210
III. MYCALESIS Group 212
Genus MYCALESIS, Hübn. 212
M. simonsii, Butler 213
IV. MELANITIS Group 214
Genus CÆROIS, Hübn. 214
C. chorinæus (Fabr.) 214
V. HIPPARCHIA Group 215
I. Euptychia section 216
Genus EUPTYCHIA, Hübn. 216
E. brixius (Godart)... 217
II. Ypthima section 218
Genus YPTHIMA, Hübn. 218
Y. bera, Hewits. 219

PAGE

Genus CŒNONYMPHA, Hübn. 219
C. tiphon (Rott.) 220
C. polydama (Haworth) 223
C. arcania (L.) 224
C. pamphilus (L.) 225
III. Erebia section 226
Genus EREBIA, Dalm. 226
E. ligea (L.)... 227
E. æthiops (Esper) 228
E. epiphron (Knoch) 229
α. E. cassiope (Fabr.) 230
IV. Hipparchia section 230
Genus HIPPARCHIA, Fabr. 231
H. semele (L.) 232
H. hyperanthus (L.) 233
α. II. arete (Müll.).... 233
Genus EPINEHELE, Hübn. 236
E. janira (L.) 236
E. tithonus (L.) 239
Genus MELANARGIA, Meigen 240
M. galatea (L.) 240
Genus ARGYROPHORUS, Blanch. 242
A. argenteus, Blanch. 242
VI. PRONOPHILA Group 242
SUB-FAMILY X. ELYMNIINÆ 243
Genus ELYMNIAS, Hübn.... 245
E. cottonis (Hewits.) 245

LIST OF PLATES.

I.—Scales, Eggs, Probosces, &c.
II.—Pupæ, Details of Larvæ, &c.
III.—Larvæ.
IV.—Fig. 1. Hestia idea (p. 15).
Fig. 2. Ideopsis daos (p. 15).
V.—Fig. 1. Danaus plexippus (p. 19).
Fig. 2. Tirumala limniace (p. 20).
VI.—Fig. 1. Nebroda lobengula (p. 22).
Fig. 2. Hirdapa rezia (p. 25).
Fig. 3. Tellervo misoriensis (p. 28).
VII.—Fig. 1. Ithomia diaphana (p. 32).
Figs. 2, 3. Ithomia flora (p. 32).
Fig. 4. Gnesia medea (p. 38).
VIII.—Fig. 1. Heliconius erato (p. 42).
Fig. 2. Heliconius vesta (p. 42).
Fig. 3. Heliconius sylvanus (p. 43).
IX.—Metamorpha dido (p. 46).
X.—Cethosia mahratta (p. 49).
XI.—Figs. 1, 2. Argynnis paphia (p. 55).
Figs. 3, 4. Melitæa cinxia (p. 76).
XII.—Figs. 1, 2. Argynnis aglaia (p. 57).
Figs. 3, 4. Brenthis euphrosyne (p. 65).
XIII.—Figs. 1, 2. Argynnis adippe (p. 58).
Figs. 3, 4. Argynnis lathonia (p. 63).
XIV.—Figs. 1, 2. Argynnis niobe (p. 61).
Figs. 3, 4. Melitæa athalia (p. 78).
Figs. 5, 6. Brenthis dia (p. 68).
XV.—Figs. 1, 2. Brenthis selene (p. 66).
Figs. 3, 4. Melitæa aurinia (p. 75).
Figs. 5, 6. Melitæa pyronia (p. 80).
XVI.—Figs. 1, 2. Polygonia c.-album (p. 87).
Fig. 3. Vanessa polychlorus (p. 89).
XVII.—Fig. 1. Vanessa antiopa (p. 92).
Fig. 2. Vanessa io (p. 95).
XVIII.—Fig. 1. Vanessa urticæ (p. 90).
Figs. 2, 3. Pyrameis cardui (p. 9[illegible]).
XIX.—Fig. 1. Cynthia juliana (p 51).
Fig. 2. Anartia amalthea (p. 109).
Fig. 3. Junonia orthosia (p. 102).

XX.—Figs. 1, 2. Kallima huttoni (p. 106).
Fig. 3. Neptis nicomedes (p. 147).
Fig. 4. Thaleropis ionia (p. 167).
XXI.—Figs. 1, 2. Catagramma astarte (p. 117).
Figs. 3, 4. Hæmatera pyramus (p. 120).
XXII.—Fig. 1. Ageronia arethusa (p. 132).
Fig. 2. Ageronia amphinome (p. 134).
XXIII.—Figs. 1, 2. Pyrameis atalanta (p. 97).
Fig. 3. Limenitis camilla (p 142).
XXIV.—Apatura iris (p. 163).
XXV.—Fig. 1. Marpesia peleus (p. 138).
Fig. 2. Protogonius fabius (p. 171).
XXVI.—Charaxes jasius (p. 179).
XXVII.—Figs. 1, 2. Charaxes tiridates (p. 184).
Fig. 3. Charaxes etheocles (p. 185).
XXVIII.—Fig. 1. Morpho adonis (p. 195).
Fig. 2. Caligo ilioneus (p. 201).
XXIX.—Morpho achilles (p. 105).
XXX.—Figs. 1, 2. Erebia ligea (p. 227).
Figs. 3, 4. Erebia æthiops (p. 228).
XXXI.—Figs. 1, 2. Melanargia galatea (p. 240).
Fig. 3. Pararge egerides (p. 208).
Figs. 4, 5. Epinephele tithonus (p. 239).
XXXII.—Figs. 1, 2, 3. Hipparchia semele (p. 232)
Figs. 4, 5. Satyrus megæra (p. 210).
XXXIII.—Figs. 1, 2. Epinephele janira (p. 236).
Fig. 3. Erebia cassiope (p. 229).
Figs. 4, 5. Hipparchia hyperanthus (p. 233).
XXXIV.—Figs. 1, 2. Cœnonympha polydama (*C. tiphon* on plate) p 223.
Figs. 3, 4. Cœnonympha tiphon (*C. polydama* on plate) p. 220.
Figs. 5, 6. Cœnonympha pamphilus (p. 225).
XXXV.—Fig. 1. Pierella ceryce (p. 206).
Fig. 2. Argyrophorus argenteus (p. 242).
Fig. 3. Yphthima bera (p. 219).
Fig. 4. Euptychia brixius (p. 217).
Fig. 5. Mycalesis simonsii (p. 213).
XXXVI.—Cærois chorinæus (p. 214).
XXXVII.—Figs. 1, 2. Elymnias cottonis (p. 245).
Fig. 3. Acræa œnone (p. 36).
Fig. 4. Actinote sodalis (p. 40).

INTRODUCTION.

ORDER LEPIDOPTERA.

THE Butterflies and Moths, or Scale-winged Insects, derive their scientific name from two Greek words—λεπίς, a scale, and πτερόν, a wing. They pass through four stages of existence: egg; larva or caterpillar; pupa, or chrysalis; and imago, or perfect insect. In their perfect state they are distinguished from other insects by having four wings, always more or less clothed with scales, and a proboscis, with which they imbibe their food. More species of *Lepidoptera* are known than of any other order of insects, except the *Coleoptera*, or Beetles; but it is probable that they will not be found to exceed the *Hymenoptera* and *Diptera* in numbers, when these orders have been exhaustively collected.

We will first discuss the general characteristics of Lepidopterous Insects in their various stages, commencing with the

EGG.

The eggs of Butterflies and Moths vary very much in size, shape, colour, and sculpture, as well as in the number deposited. Many of them are very elegant objects under the microscope, though they are always, except in the case of the *Micro-Lepidoptera*, quite large enough to be visible to the naked eye, and those of some of the large foreign species are not much less than a small pea. The insect deposits

them, singly or otherwise, according to the habit of the species, in such a situation that the larvæ, when hatched, will find a plentiful supply of appropriate food. The eggs are covered by a coating of varnish as a protection from the weather; and though many species pass the winter in other stages, perhaps the majority hibernate in the egg-state. The eggs may be round, oval, cylindrical, or conical. Some are smooth, but many are beautifully ribbed. The form of the eggs of several of our common Butterflies, as they appear when highly magnified, are represented in Plate I. as follows:

Fig. 3. Egg of *Vanessa urticæ*, with several longitudinal ridges.

Fig. 4. Egg of *Pieris brassicæ*, yellow, sub-conical, with granulated longitudinal ribs, connected by elevated cross-lines.

Fig. 5. Egg of *Epinephele tithonus*, much more compressed, but striated very much like the last.

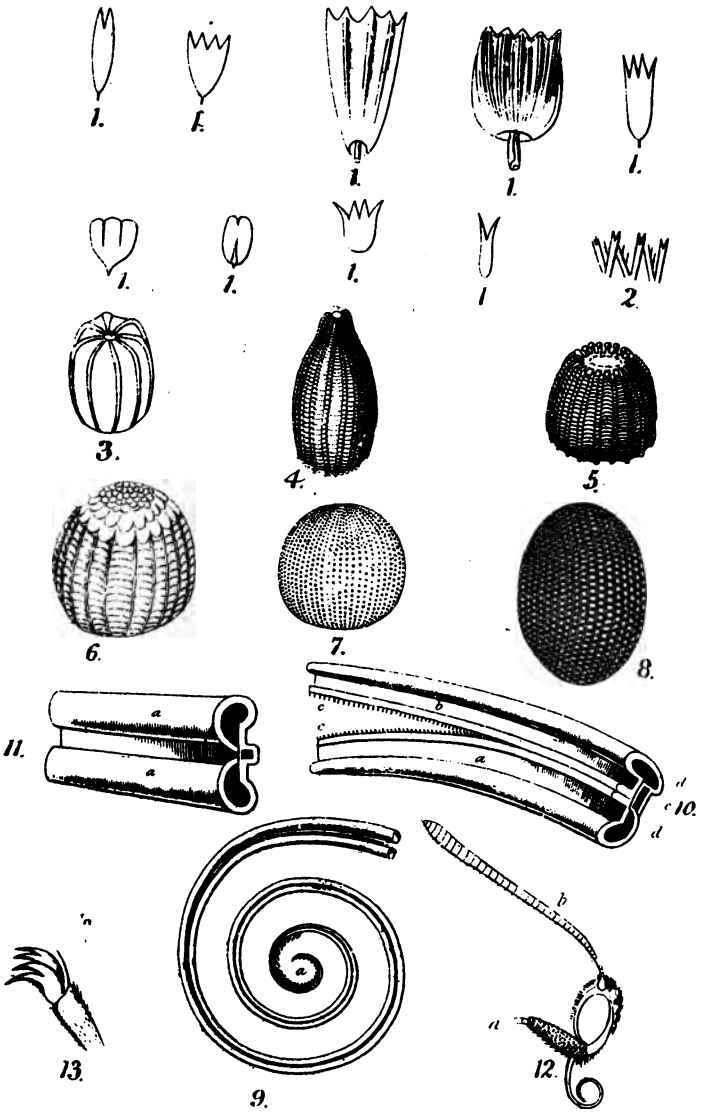
Fig. 6. Egg of *Epinephele janiro*, covered with a series of imbricated scales.

Fig. 7. Egg of *Hipparchia hyperanthus*, with rows of raised points, not unlike a sea-urchin denuded of the spines.

Fig. 8. Egg of *Pararge egerides*, covered with imbricated scales.

Butterflies rarely long survive the deposition of their eggs, and are consequently unable to pay any further attention to their offspring.

Most eggs of *Lepidoptera* are semi-transparent, and, as they approach maturity, the young larva can often be seen coiled up inside. Some eggs are provided with a kind of lid, which the larva pushes off when about to emerge. Those which are either not fertilised, or are otherwise unproductive, generally assume a shrunken appearance. Eggs are probably not much exposed to the attacks of enemies, except from certain small



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Scales, Eggs, Probosces &c.

Hymenopterous parasites, chiefly belonging to the group *Proctotrypidæ*, which deposit their eggs on or in those of other insects, the contents of which serve as food for their own larvæ. Some of these parasites, especially those belonging to the family *Mymaridæ*, or Fairy Flies, are among the smallest insects known, and are extremely elegant microscopic objects, with battledore-shaped wings, set round with a fringe of long hairs. They are sometimes just visible as specks on a window-pane.

It is even possible to classify Butterflies by the structure of their eggs, without reference to other characters. This has been attempted by Mr. W. Doherty in respect to Indian Butterflies; and he published his preliminary results in the "Journal of the Asiatic Society of Bengal," vol. 55, pt. 2, pp. 107-111 (1887). From this paper most of the characters given for the eggs of the families of Butterflies in the present work have been taken. We will presently make some extracts from his tentative notes on the classification of Butterflies according to the eggs. It must be noted that he employs *Apatura* not for *A. iris* but for *A. bolina*, for which most authors use the generic name of *Hypolimnas* or *Diadema*; also that for practical purposes he himself employs a classification in which other characters besides the eggs are taken note of. This enlarged system we shall not further notice here.

"I am not sure that the eggs form a good guide to a *primary* division of Butterflies. Even if I were sure," Mr. Doherty writes, "I should hardly have the courage to alter the received classification to the required extent. . . . . Judged purely by the egg, the classification of Butterflies would be something like this:

"1. *Danaiform Group*, including the *Danaidæ*, *Acræidæ*, and *Heliconiidæ*, connected with the *Apaturidæ* by *Cynthia* and *Cethosia*. (Egg radiate, much higher than wide, leathery.)

"2. *Satyriform Group*, including the *Satyridæ*, *Elymniadæ*, *Morphidæ*, and *Brassolidæ*, connected with the *Apaturidæ* by *Kallima*. (Egg usually smooth, globular, translucent, hard.)

"3. *Nymphaliform Group*, including the *Nymphalidæ*, connected with the *Apaturidæ* by *Charaxes*. (Egg reticulate, spiny, soft, with translucent ribs enclosing pentagonal or hexagonal spaces.)

"4. *Apaturiform Group*, including the *Apaturidæ* and *Eurytelidæ*. (Egg varying greatly, radiate, opaque, rarely much higher or lower than wide, hard.)

"5. *Lycæniform Group*, including only the *Lycænidæ*. (Egg reticulate, generally not spiny, hard, with opaque white ribs, with tetragons.)

"6. *Pieriform Group*, including the *Pieridæ* and *Libytheidæ*. (Egg radiate, ampulliform, twice as high as wide.)

"7. *Hesperiform Group*, including the *Papilionidæ*, the *Hesperidæ*, and probably the *Erycinidæ*. (Egg smooth, prickly or radiate, with minute flattened ribs, not as high as wide, opaque, dome-shaped."

It was considered a great step in advance when Denis and Schiffermüller, in 1776, first laid down the maxim, "One eye to the Butterfly, and the other to the caterpillar." But even here we are met with great difficulties, for some larvæ differ very much in different stages, and a classification based merely on adult larvæ, as is generally the case, often seems to separate widely groups otherwise closely allied; and though little has been done towards comparing larvæ in their early stages, enough is known to indicate that it is these which may be expected to manifest their real affinities. Nor have we a sufficient series of even full-grown larvæ to make our classification complete; for comparatively few are known, and our deductions might easily be upset by further discoveries. Still more is this the

case with the egg-classification, which brings into juxtaposition groups with so little apparent affinity as the *Pieridæ* and the *Libytheidæ*.

But this is only an instance of the difficulties we encounter at every step in entomology, both on account of the vast number of species with which we have to deal, and the various forms of each species, to say nothing of the enormous number of petty details, which prevents any man from attempting to study more than a very small branch of the subject thoroughly.

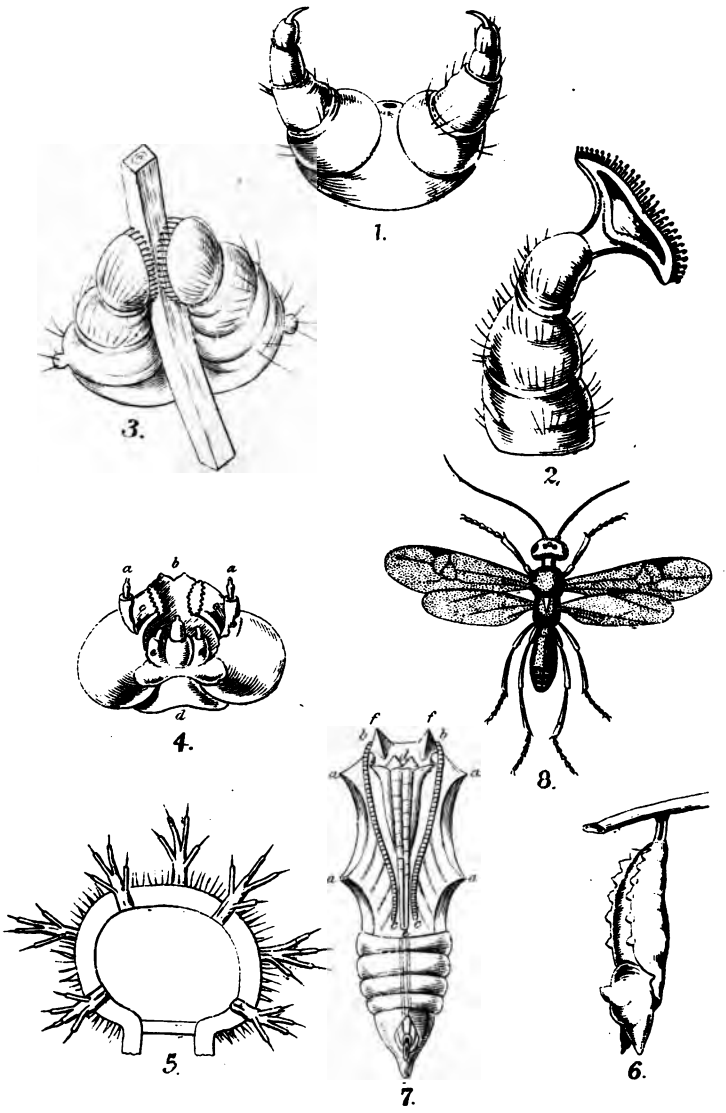
When the enclosed larva is ready to emerge, it pushes off the lid of the egg, or eats its way out, and appears as the

Larva or Caterpillar.

The term "larva" means "a mask" in Latin, and is technically applied to the second stage of all insects. "Caterpillar" is a popular term applied to the same stage of Lepidoptera only. True Caterpillars never have more than sixteen legs (except, possibly, in one or two little-known exotic species), though those of a whole family of Moths (the *Geometridæ*) have only ten; and some of the *Micro-Lepidoptera* have hardly any. The larvæ of some of the Saw-flies (*Tenthredinidæ*) are often called "False Caterpillars." They frequently much resemble true caterpillars, but have from eighteen to twenty-two legs, or else no legs at all. In certain genera of Saw-flies, too, the antennæ of the perfect insect are clubbed, a character which, though met with occasionally in all orders of insects, is comparatively infrequent, except in the case of Butterflies and Ant-Lions, and other allied *Neuroptera*.

"The body of caterpillars is long and nearly cylindrical, and is divided by deep incisions into twelve segments, exclusive of the head. The outer integument, or skin, is usually membranous and soft, but in some instances it approaches more to a coriaceous texture. The general softness of the body is of great utility, as it thereby acquires great flexibility, and easily

accommodates itself to the various curves and inflections which the insect is continually giving to it, and which are rendered necessary from the manner in which it obtains its food. Most of the caterpillars that produce day-flying Lepidoptera have sixteen legs, which are of two distinct kinds. Six of them are placed on the three anterior segments—that portion of the body which corresponds to the thorax of the winged insect— and the others are attached to the sixth, seventh, eighth, ninth, and anal segments. The form of the anterior, or thoracic, legs is wholly unlike that of the others, and they seem to be the principal instruments of locomotion. They are of a horny substance, wide at the body and gradually growing narrower to the lower extremity, where they terminate in a strong claw. Each of them is divided into several segments, which correspond to the different parts that compose the leg of the Butterfly (Plate II., fig. 1, represents a pair of these legs). The other legs, attached to the hinder or abdominal portion of the body, are soft and fleshy, and therefore have been called the membranous legs or pro-legs. Their principal use is to support the body by adhering to the slender twigs and shoots which the animals frequent to procure their food. For this purpose they can be lengthened and shortened at pleasure, and can even be drawn almost within the body, like the horns of a snail. Their general figure approaches to that of a truncated cone, which is terminated by a fleshy foot, of a construction peculiarly fitted to cling to a smooth surface or embrace a slender twig. What may be called the sole of the foot expands into a somewhat triangular plate, which is furnished on its inner edge with a row of small horny peaks or claws, consisting of a short and long one alternately, forming, as Réaumur remarks, a kind of palisade round part of the circumference. When the disc or ventral plate of the foot is dilated, these claws are turned outwards, and their small curved points find inequalities to which they can adhere,



Pupæ, Details of Larvæ, etc.

in such a position that a portion of the edge passes between the anterior legs, which support and keep it steady. Before applying its mouth, the caterpillar stretches its body and advances its head as far as possible, that it may command a larger extent of the leaf. The mandibles are moved with great rapidity, and every time they meet cut off a small piece, which is instantly swallowed. At every motion of the jaws the head is drawn nearer the legs, and after it has been brought as far as possible, the body being contracted for the purpose, it is again extended to the point where it commenced to gnaw, and the same process repeated. In this manner the mandibles describe a succession of arcs, and the leaf is cut in the segment of a circle, somewhat resembling the circular incision made by the Leaf-cutting Bees. It seems, also, that the notch in the middle of the upper lip, formerly alluded to, is of great service, as it is placed on a line with the place where the jaws arise, and serves as a groove, both to give steadiness to the margin of the leaf, and to guide it in the direction most favourable for the jaws to act upon it.

"The only remaining organs to which it is necessary to allude are the eyes and antennæ. The former appear as small dark-coloured points, arranged in two circles, containing six each, on the anterior part of the head. These points vary in size, and seem to be of the same nature as the simple eyes of spiders, and the stemmata of various kinds of insects. The antennæ, often the most conspicuous appendages of the head in perfect insects, are very minute in Lepidopterous larvæ, usually consisting of two or three short joints. They are almost always of a conical form, and many species have the power of drawing the joints within each other, like the tubes of a telescope, till they are wholly concealed.

"Many caterpillars of the day-flying *Lepidoptera* are smooth on the surface, or covered only with a very short matted

pubescence; but in some cases they are furnished with rigid hairs and numerous long spines. These hairs are sometimes simple, but more commonly they have a series of small pointed pieces springing from each side, like leaves from a stem. They are seldom placed irregularly over the surface of the skin, but usually issue from a tubercle, and diverge in all directions. These tubercular elevations vary greatly in number, and are placed in a row across the middle of the segments. The spinous caterpillars indigenous to Britain are but little remarkable when compared with many exotic species; but we have several which afford good examples of this description of defensive armour, such, for instance, as the common kinds that feed on the nettle. In these, and most other instances, the spines are sufficiently strong and sharp as readily to pierce the skin of the hand. They are very often beset with hairs, and frequently divide towards the tip into several small branches. Even when so numerous as entirely to cover the body, they are not placed promiscuously, but arranged like the tubercles formerly mentioned, in a certain order. Each segment, with the frequent exception of that next the head, is armed with a transverse series, varying in number from four to eight. The accompanying figure represents a magnified section of the caterpillar of [*Pyrameis*] *cardui*, exhibiting the number, mode of arrangement, and structure of the spines (Plate II., fig. 5). These appendages in many foreign caterpillars are said to sting like a nettle, and there can be no doubt that in all cases they are a powerful means of defence, not only against the smaller birds,* but even against more formidable enemies." (*Duncan.*)

The sole business of insects during the larval stage of their

* Few birds prey upon *hairy* caterpillars, although the Cuckoo, which is extremely fond of the larvæ of the Tiger Moth, *Hypercompa caia*, Linn. (called, *par excellence*, the *hairy-worm*, or more frequently, the Woolly Bear), forms an exception to the rule.

lives is to eat and grow. The leaves of plants and trees form their chief source of nourishment, but a few species will feed on dried animal or vegetable substances (hair, feathers, &c., like the Clothes Moths), and a single instance is known of a Lepidopterous larva being parasitic on an Homopterous insect. This is *Epipyrops anomala*, Westwood, a Moth belonging to the *Arctiidæ*, the larva of which is parasitic on the common Chinese Lantern-fly, *Hotinus candelarius*, Linn. As we have said before, the eggs are laid by the parent Butterfly or Moth on or near the appropriate food of the future larva, and in most cases the parent insect does not long survive. But undoubtedly there is a great difference in the length of life of different species, and instances are on record in which *Lepidoptera* have been observed to pair more than once, though this is believed to be quite unusual in insects, the general rule being that male insects generally die very soon after pairing, and female insects soon after they have laid their eggs. This is undoubtedly the case with many insects; but further detailed observations on the habits of a large number are greatly needed.

When the larvæ emerge from the eggs, they at once begin to feed, often making their first meal off the empty eggshell. An explanation of this curious habit has lately been offered by Dr. Scudder, who thinks that it is designed to prevent the empty eggshell from acting as an indication of the presence of the newly-hatched larva to insectivorous birds, &c.; for, while one function of larvæ is to prevent the inordinate increase of vegetation, especially in the Tropics, another is to furnish a supply of food to birds and other insect-eating animals. The excessive multiplication of insects is also kept in check by the numerous parasites, by which they are liable to be infested in all their stages. These are chiefly Hymenopterous parasites, called collectively Ichneumons, but really belonging to five or six very different families. There are also Dipterous para-

sites, chiefly of the family *Tachinidæ*, which are similar in their habits to the Ichneumons; and the maggots produce flies like blue-bottles or house-flies, but with very bristly bodies. These parasites consume the bodies of their victim, so that it dies either in the larva state or as a pupa, the parasites either undergoing their transformations within the empty skin, or emerging from it, and forming their own cocoons round it. Occasionally, if the larva has only been attacked by one or two of the smaller parasites, it attains maturity, but is more or less crippled. Generally speaking, these parasites are more or less restricted to certain species of "hosts," as they are technically called, and attack no others; but many parasites will attack a variety of different species almost indiscriminately.

On Plate II., fig. 8, we have figured one of the parasites which attack the common Cabbage Butterfly; it is *Microgaster glomeratus*, Linn., greatly magnified. "The size is very diminutive, the largest specimen seldom exceeding two lines in length. The general colour of the body is deep black, and the legs reddish-yellow. The wings are somewhat longer than the body and pubescent, each of the upper pair having a triangular black spot near the middle of the anterior margin (the pterostigma), three discoidal cells, and a triangular areolet, rather imperfectly formed. The abdomen is furnished with an ovipositor, consisting of two flat valves, and a curved horny sheath, terminating in a point. The use of this instrument is to pierce the skin of the caterpillar, and to form a conduit for conveying the eggs into the hole thus prepared for their reception. When the fly has selected a caterpillar fitted for her purpose, she alights upon its back, and plunges her weapon into its body, chiefly at the incisions of the segments, depositing an egg at every insertion. This operation is repeated till no fewer than thirty or forty eggs are sometimes laid in the body of a single caterpillar. These are soon hatched in their

singular nidus, and the grubs which they produce immediately begin to feed on the substance of the living animal. They do not, however, devour every part indiscriminately, but are taught by a wonderful instinct to abstain from injuring any vital organ, as if aware that their own existence depended on that of their unwilling foster-parent. In consequence of this the caterpillars survive for a considerable time, and sometimes retain sufficient strength to assume the pupa state, in which, however, they invariably perish. But most frequently the grubs arrive at maturity before that change takes place, and in that case they escape from the body of the caterpillar by gnawing a passage through its sides. Having in this way effected their liberation, they arrange themselves round the sides of the caterpillar, which is now so exhausted that it soon dies, and spin cocoons of a fine yellow colour, in which they are transformed into pupæ. When the perfect fly is ready to emerge, it pushes open a small lid at one end of the cocoon, and after it has been for a short time exposed to the air it is ready for flight.

"Other minute Ichneumons deposit their offspring in the eggs or in the pupæ of Butterflies, and such numbers are destroyed in this way that it is evidently one of the means employed by Providence to keep within due limits a tribe of creatures which, if left to propagate without restriction, would occasion incalculable mischief by destroying almost every kind of vegetable produce." (*Duncan.*)

Not only are most Lepidopterous larvæ subject to the attacks of perhaps ten or a dozen different species of insect parasites at least, but to those of thread-worms (*Gordius*), fungoid parasites of various kinds, and occasionally external parasites, such as acari and even fleas, besides such enemies as birds, earwigs, woodlice, &c. They are comparatively little affected by cold, but very much, as a rule, by damp, though some live in very damp situations, and a few even in the water.

Caterpillars are very voracious, and increase in size very rapidly; but as their skin does not expand in proportion, it soon becomes too tight. Then the caterpillar moults, casting off not only the skin, but the horny covering of the head and jaws, and even the lining of the principal internal organs. When a caterpillar is about to moult, its colour begins to fade, and it ceases to eat, and grows sluggish; and after the moult is over it remains sluggish for a short time, before beginning to eat with renewed voracity. Many caterpillars do not alter very much in appearance or habits or structure from moult to moult; but some differ considerably. Thus, the young caterpillars which will have the usual complement of sixteen legs when full grown, sometimes have only ten when they first leave the egg; and others change their colour, or acquire additional spines, &c., in the course of successive moults. As regards habits, several species of caterpillars live in colonies when they are young, and sometimes under a web; but when they grow older they separate, and scatter themselves over the plants on which they feed. The caterpillars of some of the smaller Moths are "miners," living in mines or galleries in the substance of leaves; and the caterpillars of the Green Forester Moths have a similar habit when young, but when older feed exposed on their food-plants. Many caterpillars are protected by their close resemblance to the plants on which they feed, and the brown caterpillars of some of the *Geometridæ*, or Loopers, as they are termed, fix themselves on a branch with their hind-legs, and then stretch their bodies stiffly out, in which attitude they are not to be distinguished from bits of dry stick. Bates once met with a caterpillar, during his travels on the Amazons, which startled him from its exact resemblance to a small venomous snake. Some few brightly-coloured caterpillars, such as those of the Spurge Hawk Moth, feed in very exposed situations; but in such cases their bright colours pro-

bably point them out to insectivorous animals as inedible.* The caterpillar just mentioned feeds openly on the spurge in the most exposed situations. Other caterpillars are provided with retractile tentacles on the neck or at the extremity of the body, which appear to be useful for driving away Ichneumon flies or other small enemies.

As a general rule the lives of caterpillars only last a few months, and in some species only a few weeks or days before they arrive at their full growth; but many caterpillars pass the winter in that state. Sometimes they emerge from the egg in the autumn, go into winter quarters immediately, and eat nothing till spring; but in other cases they hibernate when partly grown. In the case of double-brooded insects, the broods necessarily occupy much less time to pass through all their stages in summer than in winter, when the rapidity of their development is checked by the cold. And in warm countries many species are double-brooded which are only single-brooded in colder regions. It is believed that the caterpillars of Arctic *Lepidoptera* may require several seasons to attain their full growth. These may be frozen hard enough to chink when thrown into a glass, and yet recover when gradually thawed. But nearer home the longest-lived *caterpillar* known is that of the Goat Moth, which feeds inside the trunks of trees, and takes three years to arrive at maturity.

When a caterpillar has reached its full size, and is ready to moult for the last time, it prepares to become a

PUPA OR CHRYSALIS.

The term "pupa," which means a doll (puppet) in Latin, is generally applied by entomologists to the intermediate stage

* This, of course, is no protection against the attacks of parasites, but rather the reverse. I once bred some *Tachinidæ* (parasitic Diptera) from the above-mentioned larvæ.

which insects pass through before assuming the perfect state. In insects with perfect metamorphoses, including Butterflies and Moths, this state is always inactive. Many pupæ of Butterflies have a gilded appearance, and such a pupa has been styled a "chrysalis" or "aurelia," terms derived from the Greek and Latin, which express this peculiarity, and which have since been applied to all Lepidopterous pupæ, whether gilded or not. But the term "Aurelia" is no longer used, and will not be found in recent works on entomology, though eighty or a hundred years ago collectors of Butterflies and Moths were generally called "Aurelians."

The caterpillars of Butterflies generally fix their pupæ on or near their food-plants, and a large number suspend themselves by the minute hooks with which the narrow end of the body is provided, to a little button of silk, and thus hang freely by the tail. These are the *Nymphalidæ;* but in most of the other families the pupa is attached by the tail, but fixed in an upright position, being supported by a belt of silk round the body. Some of the *Satyrinæ* occasionally place their pupæ close to, or perhaps even on, the surface of the ground, and the Skippers, and the species of *Parnassius,* a genus of Alpine Butterflies which includes the well known Apollo Butterfly, form slight cocoons.

Moths are much more varied in their mode of forming their pupæ. Many are formed under the surface of the ground, some being naked, and others enclosed in a cell of agglutinated earth. Tree-feeding caterpillars often form their cocoons in the chinks of the bark, or in the earth close to the root of the tree on which they have fed. The conspicuous tough boat-shaped cocoons of yellow silk, formed by the Burnet Moths, are very common in meadows, attached to stalks of grass. Many of the large ocellated Silkworm Moths allied to our Emperor Moth form their cocoons between leaves on the

trees they have fed upon, but attach them firmly by a strong strand of silk to the branches, so that there is no danger of the leaves falling from the tree. Some species belonging to the same family form their pupæ underground, but it is not known whether the same species exhibit this difference of habit, or whether the species are different. Internal feeders, such as the Goat Moth, form their cocoons in galleries in the wood in which they have fed, and many of these have sufficient power of locomotion to push the fore part of their bodies from the gallery into the open air before emerging from the pupa. Other pupæ may be found in reeds; attached to the bark of trees; among dead leaves; or in various other situations.

Pupæ enclosed in cocoons are generally smooth, but those which are naked, and especially those of Butterflies, are frequently angular, and others are provided with spines or projecting appendages. The outlines of the principal parts of the future Butterfly or Moth are indicated in the sutures of the pupa; but the legs, &c., are not enclosed in separate sheaths, as is the case with the pupæ of beetles. However, the long proboscis of the Hawk Moths forms an exception, for this is generally enclosed in a separate sheath, sometimes of great length, and curiously twisted. The general colour of pupæ which are enclosed in cocoons, or are formed beneath the ground or in other places of concealment, is of a lighter or darker reddish-brown; but those which are exposed to the light are of brighter colours—generally green or yellow—with black spots; and green pupæ are not unfrequently brilliantly metallic.

The cocoons in which many pupæ are enclosed differ considerably. Some of them are very slight and flimsy, others very thick. Some form a network, and others are solid. They are generally white, brown, or yellow in colour, but occasionally green. That of the Silkworm is a short oval yellow or

white cocoon of solid silk, formed of a double strand measuring several hundred feet in length. Others are bottle-shaped, with an opening at one end.

On emerging from the pupa state, Butterflies and Moths usually discharge a fluid from their mouths; and when they have been unusually abundant, the phenomenon has sometimes been imagined by the ignorant to be due to a rain of blood, for this fluid is frequently of a red colour. When a Moth emerges from the pupa, this fluid serves to soften the threads of the cocoon, and some Moths are also furnished with a strong spine under the wings, which they employ to saw through the silk.

When a Butterfly or Moth emerges from the pupa it is limp and moist, and the wings are small and rudimentary; but the body of the insect rapidly dries in the air, and as first fluid and then air is forced through the nervures of the wings, they may be seen to expand and assume their full size and colour, when the insect is at last mature, and capable of reproducing its kind.

We have now to consider the insect in its final development as an

Imago, or Perfect Insect.

Butterflies and Moths, like bugs and two-winged flies, belong to the *Haustellata*, or insects with a sucking apparatus in the perfect state, in contradistinction to the *Mandibulata*, or insects provided with jaws, like beetles, bees, grasshoppers, dragonflies, &c. As in all other true insects, their body is divided into three principal parts, called respectively the head, thorax, and abdomen, each of which is connected with the next by a narrow pedicel.

The Anglo-Saxon word, "Buttor-fleoze," has been supposed to have been suggested by the insects being abundant during the butter-season. It may be so; but we should be more in-

clined to think that it may have been first suggested by the colour of the Brimstone Butterfly, even now a very conspicuous and abundant insect during most of the year, at least in the South of England, and doubtless, in former times, far more abundant than at present. The German word, "Falter," evidently alludes to the folding of the wings; and "Schmetterling," probably to the erratic flight of the insect. We have no equivalents for these words in English; but the German word "Motte" is generally applied to a Clothes-Moth.

The head is provided with the principal organs of sense, the thorax with those of locomotion, and the abdomen with those of respiration and nutrition.

The head is usually of harder consistency than the rest of the body, and is often more or less clothed with hair or scales. The most conspicuous organs are the eyes, ocelli, antennæ, palpi, and proboscis. The top of the head is called the vertex, the back the occiput, the front the face, and the space round the eyes the orbits.

The large compound eyes are placed on each side of the head, and are composed of a great number of facets, varying in number in different species. As many as 17,325 have been counted in the eye of a Butterfly. They are sometimes studded with hairs, and are sometimes naked, and this is of some importance as a subsidiary character in the classification of genera. The number of facets has not yet been sufficiently investigated in various species to be used in classification, nor do we know how far it is constant in the same species. Between the eyes are placed the ocelli, or simple eyes, on the summit of the head. These eyes consist of a single facet, and vary in number from one to three in various insects. In Moths there are always two, when they are present at all, but in Butterflies and many genera of Moths they are entirely absent. Their presence or absence forms a generic character of importance among the Moths.

Further observations on the senses of insects are much needed. There is no doubt that the two classes of eyes function in different ways, and some insects have a much more powerful sight than others. That most insects are capable of recognising colours is certain; and considering the complicated character of their visual organs, it is, to say the least of it, premature to argue, as some entomologists have recently done, that the sight of Butterflies is so imperfect that Nature can only appear to them as through a thick veil. All considerations of probability, and even practical observations, seem to be quite opposed to such an idea. Attempts have been made, with more or less success, to discover homologies between the eyes of insects and those of vertebrate animals; but we have not space to enter upon these questions in detail.

The antennæ, often called horns or feelers, are two long jointed organs, situated in front of the head, between the eyes, and before the ocelli, when the latter are present. We will defer discussing their structure in Moths to another volume; in Butterflies they are generally about half as long as the body, or a little more, and are nearly always conspicuously thickened towards the end. Sometimes this thickening is more or less gradual, in which case (especially in the Skippers), the antenna often terminates in a slight hook, and sometimes the antenna is suddenly thickened into a knob at the end. This character is so universal throughout Butterflies, and so exceptional in Moths, that it has always been considered as one of primary importance, Butterflies being called *Rhopalocera* (Club-Horns), and Moths *Heterocera* (Different Horns). This distinction may be conveniently applied to separate the first few families of *Lepidoptera* from the others, especially as we have two such different popular names for them as "Butterflies" and "Moths." In most Continental languages they have only one principal word for both, and simply prefix "day" and

"night." Thus "Papillon" in French, from the Latin "Papilio," may mean either a Butterfly or a Moth; and they distinguish them as "Papillons de jour" and "Papillons de nuit."

In front of the face project the palpi, which are three-jointed organs, generally hairy or scaly, and differing considerably in length and structure. In Butterflies they are generally nearly straight, or slightly curved upwards. When straight they are called "porrected"; when raised, "ascending"; and when depressed, "drooping." The terminal joint is usually long, slender, and pointed. The palpi of Butterflies represent the labial palpi, the maxillary palpi being absent or rudimentary. In Butterflies, the palpi are generally more or less conspicuous, and in one or two genera (*Libythina* in the *Nymphalinæ*, and *Libythea*, an aberrant genus somewhat intermediate between the *Nymphalidæ* and the *Lemoniidæ*), they are several times as long as the head.

Between the palpi we observe the proboscis, or "the long flexible tube projecting from the mouth, which forms a canal through which the alimentary juices are absorbed. This instrument, which is sometimes of great length,* is spirally convoluted when unemployed, but it can be unrolled with great rapidity, and is admirably fitted to explore the tubular corollæ and deep-seated nectaries of flowers, for the purpose of extracting their sweet secretions. It is of a cartilaginous substance, and owes its great flexibility to its being composed of numerous rings or transverse fibres, bearing some resemblance to the annulose structure of earthworms and some other animals. It is formed of two distinct pieces, which admit of being sepa-

* Especially in the *Sphingidæ*. In *Sphinx convolvuli* it attains the length of four or five inches, and in some of the largest foreign *Sphinges* (*Amphonyx*) it may be almost double that length. In Butterflies it is usually well developed, though not approaching to such great length as in the *Sphingidæ*, but in many Bombyces and other Moths, including even some *Sphingidæ* allied to *Smerinthus*, it is quite rudimentary, or even altogether absent.

rated throughout their whole length.* Each of these pieces is traversed longitudinally by a cylindrical tube, and being grooved on their inner side, they form, when united, another canal in the centre, of a somewhat square form, and wider than either of the two lateral ones. The junction of the two pieces is so close that the enclosed tube is perfectly air-tight, and this union is effected by means of an infinite number of filets, resembling the laminæ of a feather, which interlace and adhere to each other. Of these three tubes, the central one alone serves for the influx of the alimentary fluids, the two lateral ones being probably employed in transmitting air in aid of respiration,† which, however, is mainly carried on by means of stigmata or lateral pores. The outer extremity of the proboscis is frequently beset with many membranous papillæ, resembling leaflets, which have been regarded by some authors as absorbents. From having observed them chiefly in long and slender trunks, Réaumur was led to conceive that their only use is to render that organ more steady, by affording numerous points of support, and adhering in some degree to the substance into which it is inserted—an explanation rendered highly probable by the fact that the long and slender ovipositors of Ichneumons, and many other insects, are generally provided with some pointed projections near the tip, evidently intended for this purpose. Several of the figures on Plate I. are designed to illustrate the structure of the organ just described. Fig. 9 is a magnified view of the trunk, showing its general form, and the projecting points near the tip (*a*) Fig. 10, is a highly-magnified section, exhibiting the two portions (*a*, *b*), of which it is composed, each of them tubular (*c*, *d*), and forming by their junction a central canal (*e*). Fig. 11 is another section, representing the under side.

In fresh specimens of some of the larger *Lepidoptera* this may easily be done with a fine needle.

† More probably, to facilitate the pumping up of fluids into the mouth.

"The two portions of which the proboscis is composed, seem to be analogous to the maxillæ or under-jaws of the mandibulated tribes,* and to receive their great development at the expense of the other oral appendages, most of which are small and inconspicuous. This is not the case, however, with the labial palpi, which are generally of considerable size, and curved upwards in such a manner as to form two projecting points in front of the head. These organs are covered with hair-like scales, are usually of a somewhat conical shape, and consist for the most part of three articulations (see Plate I., fig. 12a). They are attached to a triangular plate, which must be regarded as the labium, or under lip, as it closes the cavity of the mouth, immediately below the insertion of the trunk. On each side of the latter, not far from the base, there is a minute tuberculiform projection, formed of two or three indistinct joints, which together seem to represent the maxillary palpi. The representation of the labrum, or upper lip, is a minute membranous piece, usually approaching to a triangular shape, and two other small projections, more or less dilated internally, and placed one on each side of the proboscis at the base, are analogous to the mandibles of gnawing insects. Most of these parts, however, exist in a very rudimentary condition, and afford another example, in addition to many already familiar to us, of Nature adhering to a particular form of structure after it has ceased to be subservient to any essential function,† for if some of these parts are designed for the same purpose which they serve so effectively when fully developed, it is not easy to see how they could be employed by the insect, or in any way prove serviceable to its economy." (*Duncan.*)

* Bees, Beetles, &c.

† Before the advent of Darwin, and his demonstration of the unity of all living beings, rudimentary structures were a great puzzle to philosophic naturalists, who found it very difficult to account for them in any rational or satisfactory manner.

The head is generally of a uniform colour, but is frequently spotted with white, in which case the antennæ are often ringed with white, and the orbits are white.

The second division of the body is the thorax, which is composed of three segments, called respectively the pro-thorax, meso-thorax, and meta-thorax. The lower surface is called the "pectus," and the sides, below the wings, are called the "pleura." The thoracic segments are closely united in *Lepidoptera*, and bear the organs of locomotion, each segment bearing a pair of legs, and the two hinder pairs the wings also. The scutellum, which is so largely developed in many beetles and bugs, is inconspicuous in *Lepidoptera*, and has its point directed forwards.

The pro-thorax is narrow in Butterflies, and in many species it is hardly visible above; on the under surface it bears the first pair of legs. On the upper surface, when much developed, it is sometimes of a different colour; thus, in many East Indian species of *Papilio* and *Ornithoptera*, it is of a bright scarlet. In such a case it is called the collar. The meso-thorax and meta-thorax are closely united in Butterflies, resembling one solid piece; the former bears the second pair of legs and the front pair of wings; and the latter bears the third pair of legs and the hind pair of wings. In front of the fore-wings are two hairy tufts, resting on horny scales, which are called the lappets, patagia, or tegulæ. Many Butterflies are spotted with red or white on the head and thorax, and in this case the pleura is likewise spotted, and the antennæ and legs are ringed with darker and paler, the under surface of the antennæ and especially the tip of the club, and also the orbits, being likewise paler. In some Moths which spin cocoons, a strong spine may be seen at the base of the wings beneath, which the insects use in making their way out.

The legs, as in other insects, are composed of the usual five

parts,—the coxæ; the trochanters; the femora, or thighs; the tibiæ, or shanks; and the tarsi, or feet. The last three are the most important to notice in *Lepidoptera*. The tarsi are normally five-jointed, but in many *Nymphalidæ*, &c., the front-legs are rudimentary in one, or both, sexes, but especially in the males, and in such cases the tarsi may be reduced to a single joint, or are occasionally even absent. The tibiæ are generally provided with a pair of spines at the extremity, and frequently in the middle also. The tarsi, when fully developed, terminate in a pair of claws, which are bifid (Plate I., fig. 13) in many Butterflies, as, for instance, in the *Pieridæ*. In the groups which have the front legs more or less aborted in one or both sexes, the first stage is the disappearance of one or both of the tarsal claws. In some Moths (*Hepialidæ*, &c.), the hind pair of legs are imperfectly developed in the males.

The legs are sometimes naked, and sometimes covered with short or long hairs, occasionally almost spinose. In some Moths there is a large fan-like tuft of hair on the legs of the males.

The legs are usually concolorous with the body, whether hairy or not. Sometimes they are of a different colour; in *Larinopoda*, a white African genus of *Lycænidæ*, the legs are always reddish or tawny. When the antennæ are ringed with black and white, the legs are generally ringed or spotted with white too, especially at the knees and at the joints of the tarsi. The legs in Butterflies are weak, and are generally only used to step circumspectly over a flower, though some Moths will shuffle along a plane surface in a manner that has gained for one of them the soubriquet of "The Mouse."

The substance of the wings consists of a double membrane, permeated by branching air-tubes, generally called nervures. Their arrangement is so important for classification that it will

be described in a separate section. The wing-membrane itself is colourless and transparent, but is clothed with fine scales, which are easily rubbed off, if the insect is handled roughly.

"The mode of painting employed to produce these rich tints may not improperly be called a kind of natural mosaic, for the colours invariably reside in the scales, which form a dense covering over the whole surface. These scales are usually of an oval or elongated form, and truncated at the tip, where they are occasionally divided into teeth; but sometimes they are conical, linear, or triangular. A considerable number of the forms which they exhibit are represented at the top of Plate I. Fig. 2 shows the form which they sometimes assume in the fringe which surrounds the wing. They are fixed in the wing by means of a narrow pedicel, and are most commonly disposed in transverse rows, placed close together, and overlapping each other like the tiles of a roof. In some instances they are placed without any regular order, and in certain cases there appear to be two layers of scales on both sides of the wings. When they are rubbed off, the wing is found to consist of an elastic membrane, thin and transparent, and marked with slightly indented lines, forming a kind of groove for the insertion of the scales. The latter are so minute that they appear to the naked eye like particles of dust, and as they are closely placed, their numbers in a single insect are astonishingly great. Leesewentock counted upwards of 400,000 on the wings of the Silk-Moth, an insect not above one-fourth of the size of some of our native Butterflies. But how much inferior must this number be to that necessary to form a covering to some foreign Butterflies, the wings of which expand upwards of half a foot; or certain species of Moths, some of which, such as the Atlas-Moth of the East, or the Great Owl-Moth of Brazil, sometimes measure nearly a foot across the wings? A modern mo-

saic pattern may contain 870 tesserulæ, in separate pieces, in one square inch of surface; but the same extent of a Butterfly's wing sometimes consists of no fewer than 100,736!" (*Duncan.*)

In addition to the ordinary scales, the males of many Butterflies possess special additional scales, smaller than the others, which have been called plumules, battledore-scales, or androconia. Sometimes they are scattered among, and hidden under, the ordinary scales, but they are frequently placed in masses on a particular part of the wing, and covered by large overlapping scales. They are generally colourless, but sometimes black or brown. Not unfrequently they are concealed in a pocket or fold of the wing. They are generally longer and softer than the ordinary scales, and evidently serve as outlets for scent-glands in the tissue of the wing.*

The scales are considered to be modified hairs, and consist of double-walled closed sacs, which afterwards flatten out, and are striated. The colour of the wings of the insect is partly due to pigment contained in these sacs, and partly, especially in the case of shot or iridescent tints, to the refraction of light from the striated scales of the wing.

In many Butterflies and Moths, more or less of the wing, from a few small spots, to the whole surface except the borders, is colourless. This is the case in our Bee Hawk-Moths, and Clear-wing Moths; but though only one genus of European Butterflies (*Carcharodus*) exhibits even as much as a few transparent spots on the wings, many South American genera of different groups (*Ithomia*, *Hetæra*, *Zeonia*, &c.) have the wings as colourless as in our Clear-wing Moths. But in the case of the Bee Hawk-Moths, and probably of many other transparent-winged Lepidoptera, the insect, on emerging from the pupa, is slightly clothed with loose scales over the transparent part of the wings, which soon rub off.

* See Thomas, "American Naturalist," vol. 27, p. 1018 (November, 1893).

Scales are not the only covering of the wings of *Lepidoptera*. The edges of the wings in most cases are bordered with a row of short hairs, sometimes of a different colour to the rest of the wing, especially between the nervures. These are called the fringes or cilia of the wings, and in many of the smaller Moths, especially those allied to the Clothes Moths, they are very long. More or less of the base of the wings of Butterflies is often covered with long hair; and in many of the larger foreign Butterflies the inner margin of the hind-wings forms a long deep fold, filled with fluffy hair. But apart from this, the inner-margin of the wings in Butterflies is often fringed with much longer hair than the hind-margin.

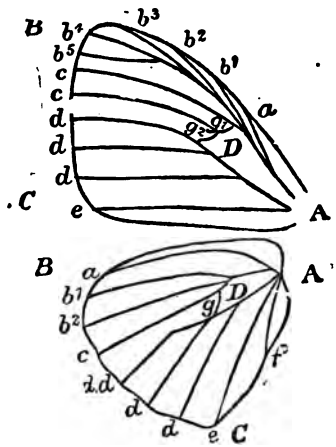
The abdomen in the *Lepidoptera* is composed of nine segments. It is frequently crested on the back, and tufted at the extremity in Moths. In Butterflies, the males are sometimes furnished with large clasping organs at the extremity, or have the power of protruding scent-tufts from the abdomen; in the females of Moths an ovipositor is occasionally present.

On the Wings and Neuration of Butterflies.

The wings of insects are traversed by hollow tubes, which are technically called nervures, and which serve first as circulatory organs for the fluid which is forced through the wings on the emergence of the insect from the pupa, and thus causes their expansion and development; and afterwards as air-tubes, and as ribs to strengthen the wings and to keep them expanded. In many insects, including some Moths, but not in Butterflies, these ribs fold together like a fan, and in beetles, &c., the ends are folded back again. These nervures, differ much in their number and arrangement, not only in different orders, but even in allied groups of the same order; and form a valuable aid to classification. We will now proceed to give a short account of their usual arrangement in Butterflies, with the aid

of the accompanying woodcut, which represents the neuration of *Ageronia.*

To begin with, then, all Butterflies have four wings, two on each side. The first pair is called the fore-wings, the front wings, the anterior wings, or in Latin, as it is useful to remember, "alæ anticæ." The second pair are called hind-wings, or posterior wings, in Latin "alæ posticæ." Many authors write "primaries" and "secondaries" as equivalent to fore- and hind-wings; but the use of these terms ought to be



abandoned, because they are in universal employment in a totally different sense in Birds.

The fore-wings are generally roughly triangular in shape. The narrow end which joins on to the body is called the base; the fore-wings being attached to the sides of the meso-thorax, and the hind-wings to the side of the meta-thorax. The front edge of the wings is called the costa; it is generally more or less strongly arched, and in Butterflies is very rarely slightly concave. In a few genera, *e.g.*, *Charaxes* and *Prioneris*, it is serrated

and ridged like a saw. At its extremity is the tip, the apex, or the anterior angle of the wing. This is often more or less angulated, sometimes being pointed, or running out into a projecting angle, or it may even be hooked; but in many species it is rounded off. The longest portion of the wing is generally at or a little below the tip. The edge of the wing furthest from the body is called the hind-margin. Sometimes it is regularly rounded, in which case the wings are said to be entire, or it may be more or less toothed (dentated, or denticulated), or obliquely hollowed between the ends of each two of the nervures (sinuated). The concave spaces between the nervures are then called "incisions." On the fore-wings, the hind-margin is generally slightly curved towards the hinder angle (the anal angle as it is sometimes called, though this term is properly applied only to that of the hind-wings), but it is frequently nearly straight, or more or less convex or concave, or with angular projections; in fact, its outline varies more in different species than that of any other part of the wing. On the hind-wings, the hind-margin is generally rounded, but is sometimes angulated once or twice, or furnished with a more or less long projection, called a tail, most frequently at the end of the upper median nervule (see below), though tails may be thrown off at any of the lower nervules, either independently or conjointly with one at the point just mentioned. When the hind-wing is simply angulated we have called this point the "outer angle." The anal angle of the hind-wings is often rounded off, or even concave, but sometimes projects into a point, or even a tail. The inner-margin is opposite to the costa on the fore-wings and is generally nearly straight, or very slightly concave, but in some genera, especially in some of those allied to *Euplœa*, it is strongly concave. On the hind-wings the inner-margin lies parallel to the sides of the abdomen, and sometimes forms a kind of gutter to receive it, or is concave.

In many species of *Papilio* it forms a large fold, filled with fluffy hair, frequently concealing androconia.

As regards the wing-outlines, *A* in our figure represents the base of the wings, *B* the tip, or apex, and *C* the hinder or anal angle. The costa would run from *A* to *B*, the hind-margin from *B* to *C*, and the inner-margin from A to *C*. The tail on the hind-wings might be at any of the points marked d and e, but most frequently at the point marked dd, where also would be placed the outer angle in a species with angulated hind-wings.

We must now give some account of the veining of the wings. In the first place, it was probably much more complicated formerly than at present in Butterflies, as it is still in some Moths. The veins which run from the base are called nervures, and all the others nervules. Sometimes they are thickened or inflated at the base, especially in the *Satyrinæ*, but more often they are apparently thickened through density of scaling along their course, as in the male of the Silver-washed Fritillary, to take the most familiar example. In many Butterflies faint lines may be noticed between the ordinary nervures, including two in the cell, and in some cases these lines, which doubtless indicate the situation of lost nervures, now atrophied, are marked by scales in such a way as to give them the appearance of being actually nervures. This is especially the case in some *Pieridæ* with radiating markings along the nervures, chiefly on the under surface of the wings, as in our Green-veined White Butterfly. Certain Moths have a much more complicated system of neuration than Butterflies, which attains its maximum of development in the families *Castniidæ*, *Hepialidæ*, and *Zeuzeridæ*, while some of the smaller *Tineidæ*, &c., have a much simpler arrangement. But in Butterflies the neuration, though varying infinitely in details, is generally arranged on a very uniform plan.

Commencing with the costa, we first find a single nervure (*a*) running from the base, and entering the costa. It is called the costal nervure, and differs much in length in different Butterflies. It is never branched at the extremity, but sometimes, as in the genus *Archonias*, in the *Pieridæ*, the first sub-costal nervule unites with it. The costal nervure is much more strongly developed on the hind-wings than on the fore-wings; and at the base of the hind-wings it throws up a short branch in many of the larger Butterflies (not shown in our figure) which, when present, often encloses a space at the base of the wing. This nervure is called the "pre-costal nervure."

Next to the costal nervure comes the sub-costal nervure, which is generally five-branched on the fore-wings (*b*. 1, 2, 3, 4, 5). These are sometimes called branches of the sub-costal nervure, and sometimes sub-costal nervules. As already mentioned, the first sub-costal nervule sometimes unites with the costal nervure towards its extremity. There are generally five sub-costal nervules on the fore-wings, but in many genera of Butterflies there are only four, and sometimes only three. The position where these nervules branch off, their curvature, and the points at which they enter the costa, or the neighbourhood of the apex of the wing, are of great importance in the classifi, cation of genera. The first two, or the first three, are often sub-parallel; in *Synchloe*, the first two approximate so much that they are sometimes united in the middle. On the hind-wings the sub-costal nervure divides into two branches only.

Under the sub-costal nervure is a wide open space usually extending from the base to the middle of the wing, or even further. This is called the discoidal cell (*AD*), and from it two nervules run to the hind-margin on the fore-wings, and one on the hind-wings. These are called radial or discoidal nervules (*cc*), and are distinguished as the first and second, or the upper and lower. The upper radial nervule is sometimes united to the

sub-costal nervure at its base, so as to give it the appearance of being an additional branch of the sub-costal. In several dark-coloured species of *Papilio*, &c., there is an appearance of lines radiating from the base in the cell; but this is delusive, and only one Butterfly is known to me with the radial nervules continued as nervures through the cell to the base of the wings. This is *Davidina armandi*, Oberthür, a rare and little known *Pieride* from China and Thibet. On the hind-wings there is only one radial nervule; but some authors consider the sub-costal nervure of the hind-wings to be unbranched, and call the second branch (*b.* 2. of our figure) the upper radial instead of the second sub-costal nervule.

In most Butterflies the cell is closed by small cross-nervures called disco cellular nervules (*g.* 1, *g.* 2), but in the *Nymphalinæ* and *Morphinæ*, the lower disco-cellular nervule is either slender and rudimentary, as in our figure, or entirely wanting. In the latter case the cell is said to be open. The cell is more frequently open in the hind-wings, but very commonly in the fore-wings also. The space between the cell and the hind-margin is called the disc of the wing. In the *Brassolinæ* there is a small additional cell above the base of the discoidal cell of the hind-wings, called the pre-costal cell.

Below the discoidal cell runs the median nervure, which is always three-branched (*d*, *d*, *d*). In England the median nervules (or branches of the median nervure) are generally counted from above downwards; but as they are thrown off in succession from below, it would appear more correct to count them from below upwards, as is generally done by the German lepidopterists. In order to avoid any ambiguity, it is perhaps better to call them the upper, lower and middle median nervules. In many *Nymphalinæ*, there is a short branch thrown off downwards from the median nervure near its base, which Schatz and Röber call the "spur." When it is continued downwards to

the sub-median nervure, so as to enclose a space, it is called the interno-median nervule.

Below the median nervure runs the sub-median nervure (*e*) which is never branched. Below this again, is the internal nervure (*f*), which is generally very short, or wanting on the fore-wings. When present, it may either run to the inner margin near the base, or may unite almost immediately with the sub-median, giving the sub median the appearance of being forked at the base. On the hind-wings it is generally fairly well developed; and although it is absent in the *Papilionidæ*, in the *Pieridæ* it is generally almost as long as the sub-median nervure; and indeed, in many species, marked like our Green-veined Whites, a line of colour runs down between these nervures, giving the insects the appearance of possessing three sub-median nervures instead of two. If the term "internal nervure" was not in general use, it would perhaps be better to call these nervures the upper and lower sub-median nervures. The presence of the internal nervure on the hind-wings of the *Pieridæ*, contrasted with its total absence in the *Papilionidæ*, and combined with other equally constant and important characters which will be mentioned in their place, seems to indicate that these two groups are sufficiently distinct to be treated as families, instead of as sub-families, as is usually the case.

On Collecting Butterflies and Moths.

The most useful implement for collecting Butterflies and Moths on the wing is the ring-net. It is a ring of iron, jointed so that it can be folded up, and put into the pocket when not in use. It is made to screw on to the end of an ordinary walking-stick. Neither the ring nor the net should be heavier than needful to give a proper balance in the hand. The ring should be about a foot broad, and the net should be made of green gauze, or some similar material. It should be somewhat tapering, but rounded at the end, not square or pointed, for it

should contain no corners; and it should be long enough to be lapped round the stick with a jerk, when used, to prevent the Butterfly from escaping. Of course, a much simpler instrument may be made to answer the purpose, and even a ring of willow-twigs tied between a forked stick might serve as the framework of a net, when nothing else is available. Although a Butterfly-net much resembles a fisherman's landing-net, yet nothing could be more unsuited to the purpose than the latter, even if the string net should be replaced with one of green gauze. It would be found far too clumsy and inconvenient in practice; the ring would be too small, and the weight would be all at one end.

Some collectors prefer what it called the umbrella-net—a net of green gauze made to slide up and down a stick, and fitting into an umbrella-case when not in use. But this, though useful for many purposes, such as sweeping grass or bushes, or for beating caterpillars into, is rather too short for ordinary collecting, and the stick through the middle is another objection. The long net used by the old collectors for catching the Purple Emperor (a net on a pole twenty or thirty feet long) is now rarely used. If necessary, one can be improvised from a sapling; but it is now found more advantageous to lure high-flying insects to the ground with carrion, or some similar bait.

It is hard work to run down a Butterfly, and, in general, it is unnecessary. Some have a slow flight and settle frequently on flowers, and many of those which fly rapidly have a habit of constantly returning to the same spot. If the ground is sufficiently open to allow of following up a Butterfly, it is almost sure to settle sooner or later. Many Moths may be caught on flowers, especially at dusk; but a few, such as the Humming-Bird Hawk-Moth, feed on the wing, and are capable of very rapid flight, especially if alarmed. Almost the only means of catching it is to bring the net up very gently as near the insect

as possible without scaring it, and then to strike suddenly. Even this Moth, however, will sometimes settle on a wall, a stump on a bank under a hedge, or in some other situation where its colour protects it; but it is rare to meet with it, except on the wing.

Many Moths fly in the daytime in meadows, &c., like Butterflies, or may be dislodged from their resting-places by beating hedges and bushes on the side opposite to the wind. On dull days, or at dusk, Butterflies may occasionally be started in a similar manner, or they may be found asleep on grass-stems, &c. Butterflies will settle on leaves as well as on flowers, or on the ground, or on tree-trunks. In the last case they are very difficult to catch, as it is not easy to strike at them in such a manner that they cannot readily elude the net. Many Butterflies will settle in damp places to imbibe the moisture, or on fruit, and others will settle on dung or carrion.

A great many of the night-flying Moths, even including the largest species, may be found sitting on tree-trunks in the early part of the day; later on, they generally seek a more retired resting-place. Others may be captured by painting tree-trunks, &c., with a sweet mixture, and visiting the trees with a lantern after dark. This mode of collecting is called "sugaring," and the substance commonly used is a mixture of coarse brown sugar boiled in beer to a sufficient consistency to adhere to the trees, and flavoured with a few drops of rum. Apple-flavouring has also been found very attractive.

Butterflies, and slender-bodied Moths, may be killed by a pinch under the thorax; but unless very carefully done, this is liable to injure the specimens, especially if they are required to show the under surface and legs; and many collectors use a bottle partly filled with chopped laurel-leaves, or charged with cyanide of potassium, or carry a small bottle of chloroform with them. Full particulars on all these points may be found in Knaggs' "Lepidopterist's Guide," a useful little manu

which goes thoroughly into all the minutiæ of collecting, preserving, breeding, &c. Poisons, however, are not always easily obtained; and cyanide sometimes discolours the insects.

When the insect is killed, it is taken carefully between the finger and thumb, and a pin is passed through the centre of the thorax. The pins used for insects are long, slender, and elastic, with small heads; and "entomological pins" can be purchased of any dealer in objects of natural history. The pin used should always be proportionate to the size of the insect, and in the case of very small Moths, the fine pins with which they are transfixed are frequently mounted on small oblong stages of pith, through the other end of which a larger pin is passed.

Insects pinned in the field are put into small wooden boxes, lined with cork, and carried in the pocket; but many collectors prefer to use chip boxes, in which Moths and the smaller Butterflies can be carried home alive. Only one specimen must be put into each box, and the larger and more active species must be killed at once, as they would knock themselves to pieces, if thus imprisoned. Moths asleep on the trunks of trees may very often be pushed into a chip box with the help of the lid, and secured at once. It is necessary to be very particular to keep full boxes in one pocket, and empty ones in another.

Collectors abroad generally put their captures into papers folded so as to resemble a triangular envelope, by doubling the lower end of an oblong piece of paper across one side, after which the end can be turned down to close it. Most of the insects received from tropical countries are sent home in this way; but the legs and antennæ are liable to be damaged.

Whenever possible, it is better to set insects before they become stiff; but if they are stiff, or are received unset, they can easily be relaxed by putting them into a closed vessel

with a layer of damp sand at the bottom, for a few hours or days. They must, however, be watched, and set as soon as they are sufficiently limp. If not quite relaxed, the wings will be liable to break, or to slip out of position afterwards; but if left too long in the relaxing jar, the insects will become rotten or mouldy.

Setting-boards are made of wood, with a groove down the middle, lined with cork, and proportioned in depth to the height at which it is proposed to set the insect. The sides are also covered with cork, but this is unnecessary when insects are set with threads. According to the old English fashion of setting, the groove was very shallow, and the sides of the setting-board were sloping, so that the insect was close to the paper of the cabinet, and the wings sloped over, and nearly touched it, on each side. But many collectors now prefer the Continental method, in which the insect is raised half an inch or more from the surface of the drawer, and the wings are spread out quite flat on each side. In setting an insect, the pin is fixed in the centre of the groove, and the wings, antennæ, and legs are placed in as natural a position as possible, with the aid of a needle, great care being taken not to pierce or tear the wings, or to break the antennæ. They are then secured in their places by "braces," or long tapering strips of paper or cardboard, with pins thrust through the broader end; or a thread may be wound over the wings, from end to end of the setting-board. This, however, requires both neatness and practice to do it well, or it is liable to rub off the scales in lines.

Insects are generally kept in store-boxes or cabinets. Store boxes may be of any convenient size, and are made like back-gammon boards, and corked within on both sides. Cabinets are made to contain any required number of drawers, arranged in a single or double tier, and it is of great inportance that all

the drawers, at least in the same cabinet, should be made interchangeable. The drawers are made with a side partition to contain camphor, and are provided with tight-fitting glass lids, to exclude air and dust. The drawers are lined with cork, and are covered with white or neutral-tinted paper.

The specimens are then arranged in the cabinet in rows, separated by pencil lines, black threads, or narrow slips of coloured paper. The name of the genus is placed above them, and that of the species, written or printed smaller, below. At least four specimens of each species are required, to show the upper and under surfaces of both sexes; but it is better to have more, as a row gives a much better idea of a species than a single specimen of each sex, and as many varieties should be added as can be obtained.

Light bleaches insects; and if no camphor is kept with them, they are liable to be destroyed by mites, &c.; if, however, mites should get into the collection, which is generally first shown by a little heap of dust under an infected specimen, benzole should be applied freely to the specimens attacked. It will not injure them, and will soon evaporate. Sometimes an oily substance exudes from the bodies of Moths, especially of those the larvæ of which feed within the trunks of trees, such as the *Ægeriidæ* and *Zeuzeridæ*. In this case, too, benzole should be poured over the specimen, or it may even be soaked in the liquid. In order to diminish the risk of grease, some collectors open the bodies of large Moths while still soft, and remove the contents of the abdomen, stuffing it afterwards with cotton-wool.

Twenty years ago the formation of a collection of foreign Butterflies and Moths was a matter of great difficulty and expense. Of late years, however, they have been brought over in such quantities that the market has been completly glutted with them; and though fine and rare Butterflies from little-

visited localities will always fetch good prices (one of the rarer species of *Ornithoptera* was sold for £15 at an auction a short time since), yet many Butterflies can now be bought for fewer shillings than they would have fetched pounds a few years ago. Consequently, a collector in London could easily bring together a very fair collection, if he set about it judiciously, at a comparatively small cost, even if he made it a rule not to pay a higher price than, say, a shilling a specimen. Undoubtedly the cheapest way of buying Butterflies is to buy miscellaneous lots at an auction, especially lots in papers. They are easily relaxed afterwards, and though some of the specimens will be bad, there will probably be enough good ones among them to be worth the money paid for them, at any rate by a beginner. But specimens without antennæ, or with the wings torn, should be avoided as far as possible, both on the ground of appearance and of value. If, however, they are needed for anatomical or microscopic purposes, such as the study of the legs or scales, it is different. And it is well to denude a specimen of each species which can be spared, of scales on one side of the wings, to illustrate the neuration, preserving the other half intact, in order to ensure the absolutely current indentification of the species.

Insects which are most eagerly sought after, and which are most difficult to obtain, at least at a reasonable price, are rare British (or so-called British) specimens, especially the extinct fen insects, varieties of indigenous species, and insects from Central Asia, the less visited islands of the Pacific (especially the fine *Ornithopteræ*, many of which are confined to a single small island), and the finer and rarer Butterflies of the west of Tropical America, such as various species of *Morpho*, *Agrias*, &c., from Ecuador, Peru, and Bolivia. There are some countries and islands rarely visited by collectors, because they do not produce enough species to make it

while, as the insects found there are not handsome enough to command a correspondingly high price. Yet they furnish many interesting species, which are ordinarily difficult to obtain. Such countries are Chili, the Canaries, Madeira, and New Zealand. But in the case of some of these localities, as also in others, the help of friends abroad may sometimes be useful.

On the Geographical Distribution of Butterflies.

Butterflies are distributed over the surface of the earth in very unequal proportions, and are most numerous where the vegetation is most varied. As a general rule, in Europe and Asia they are most numerous along the great ranges of mountains in the warmer countries, thinning rapidly both north and south, and towards the west.

The regions of Geographical Distribution in use by most recent Zoologists are those proposed by Dr. P. L. Sclater in his paper on the Geographical Distribution of the Class Aves.* I subsequently published a paper on the Geographical Distribution of Diurnal Lepidoptera,† following the same system; and it was also adopted by Dr. Alfred Russel Wallace in his important work on the Zoological Distribution of Animals, though he suggested a division of each of the large regions into four sub-regions.

The provinces adopted by Dr. Sclater are, roughly, as follows:

I. Palæarctic Region.

Includes Europe, the Mediterranean Region, North Africa to the Sahara, and Asia, except India south of the Himalayas, South China, and islands south of Japan.

* Journal of the Linnean Society of London, Zoology, vol. ii., pp. 130-145.

† *Ibid.*, vol. xi. pp. 431-439.

II. Ethiopian Region.

Africa, south of the Sahara, and the adjacent islands.

III. Indian, or Indo-Malayan Region.

India, south of the Himalayas, South China, the Malay Peninsula, and the Philippines, Formosa, Ceylon, Borneo, Java, Sumatra, &c.

IV. Australian, or Austro-Malayan Region.

Celebes (?), the Moluccas, Papua and the Papuan Islands, Australia, Tasmania, New Zealand, and the Pacific Islands.

V. Nearctic Region.

Greenland and North America to centre of Mexico.

VI. Neotropical Region.

Southern Mexico, Central and South America, West Indies, &c.

I. PALÆARCTIC REGION AND V. NEARCTIC REGION.

The Nearctic Region is only artificially separated from the Palæarctic Region and presents no feature of importance beyond the presence of a few stragglers from the Neotropical Fauna, and it should be united to the Palæarctic Region.

Our British genera of Butterflies, with the exception of *Limenitis*, *Apatura*, *Pieris*, *Papilio*, and some genera of *Hesperiidæ* extend little, if at all, beyond the limits of this united region. Among other characteristic genera which are not British, but are likewise almost exclusively confined within its limits, are *Œneis* and *Parnassius* (alpine or circumpolar), *Triphysa* (Central Europe and Asia), *Thestor*, *Læosopis*, *Zegris*, *Hypermnestra*, *Doritis*, and *Thais* (South Europe or Western Asia), *Mesapia* (Himalayas), and *Sericinus* (North China).

In Europe the Alpine ranges from the Balkans to the Pyrenees are richest in species, about 200 of the 300 European

Butterflies being found in their neighbourhood. But north and south the species thin out very rapidly, especially to the north-west. The mountains of Great Britain, South Spain, and South Italy produce hardly any truly alpine species; and many of our familiar Central European species become mountain insects in the Sierra Nevada. Scandinavia is almost as rich in species of Butterflies as Southern Spain; and both countries produce nearly twice as many species as Great Britain, which has not only the disadvantage of being a north-western country, but is also an island. Great Britain produces less than seventy species of Butterflies, and there are many localities, even in North France and Germany, which would produce nearly as many species within the radius of a few miles. On the south coast of the Mediterranean the number of species is still further reduced, for many species do not cross the sea. The extreme North is not without Butterflies, many species being met with in Labrador, Lapland, &c.; and even in Greenland species of *Œneis*, *Brenthis*, *Polyommatus*, and *Colias* have been met with almost as far north as our explorers have yet penetrated. But so far as is known, no indigenous Butterfly is found in Iceland.

In Europe and the Mediterranean District three sub-regions can be identified: the Central European, the Alpine and Arctic, and the Central Steppe-Faunæ. The last extends from the Himalayas through Western and Central Asia, and along the southern coast of the Mediterranean to the Canaries; and here it may be mentioned that islands, though often very poor in species, are generally very rich in peculiar species or well-marked local varieties. This is well exemplified by Corsica, Sardinia, Madeira, the Canaries, and New Zealand, and to a lesser extent, even by the British Islands.

Very few species of typical Indian or African genera, such as *Danaus*, *Neptis*, and *Charaxes* extend into Europe, but in

Eastern Asia a great many characteristic Indian forms extend as far as Japan, and, to a lesser extent, to the Amoor Region. The mountainous regions of Central Asia are remarkable for the number and beauty of the species of *Parnassius* and *Colias* which they produce. *Erebia* is equally well represented in Europe and Asia. A few Palæarctic forms invade the adjacent provinces; thus *Colias electra*, the African representative of our common *C. hyale*, Linn.(= *C. edusa*, Fabr.), is met with throughout Eastern Africa to as far as the Cape; and the Butterflies of the South American countries between the Andes and the sea have a strong resemblance to European species, even as far south as Chili and Patagonia. North America is remarkable for the number and variety of the species of *Argynnis* which it produces; and the finest species of the circumpolar genus *Œneis*, which otherwise is rather more of an Arctic than an Alpine genus, are found in California and the Rocky Mountains. The genera *Colias* and *Polygonia* are also specially well represented in North America. The greatest variety of species in the United States are found in the Western and Southern States.

II. ETHIOPIAN REGION.

There are two well-marked divisions in Continental Africa, south of the Sahara: the West Coast Fauna and the East Coast Fauna. The West Coast fauna is by far the richest, and extends eastwards, to the head-waters of the Nile, collections from the Bahr-el-Ghazal showing but little difference from collections made at Sierra Leone, or the Cameroons. On the other hand, there is much general sameness between Butterflies from Abyssinia, the Lake Region, Zanzibar, and Natal; while many species occurring near the east coast are closely allied to, though generally distinct from, those of Madagascar.

There is considerable resemblance, too, between the Butterflies of Africa and India; but the number of genera peculiar,

or almost peculiar, to Africa is very large. Among these, we may mention *Amauris*, *Acræa* (a *very* few representatives of which occur from India to Australia), *Lachnoptera*, *Salamis*, *Pseudacræa*, *Crenis*, *Euxanthe*, *Euryphene*, *Euphædra*, *Cymothoe*, *Charaxes*, *Palla*, a cluster of genera of *Lycænidæ* allied to *Pentila*, *Liptena*, *Epitola*, &c., *Drurya*, *Leucochitonea*, *Caprona*, &c. Many fine groups of *Charaxes* and *Papilio*, and the bulk of the Orange-tips of the genus *Teracolus*, are also African.

In East Africa and Madagascar we meet with the most beautiful of all Moths, the genus *Chrysiridia*.

III. INDIAN REGION.

This region also, though possessing some African, Palæarctic, and especially Australian affinities, is very rich in peculiar or characteristic forms. Among these are *Thaumantias*, and other genera of Old World *Morphinæ*, *Cethosia*, *Kallima*, *Limenitis*, *Athyma*, *Neptis*, *Euthalia*, *Ilerda*, *Deudorix*, *Liphyra*, *Prioneris*, *Dercas*, *Leptocircus*, &c. Some of these genera, as well as the *Danainæ* and *Elymniinæ* generally, are almost equally well represented in the Australian Region. In *Ornithoptera*, the yellow species, including *O. magellanus*, the most wonderful of all, which is confined to the Philippines, are found within the Indian Region, but the only green species belonging to it is *O. brookeana*, which is found in Malacca, Borneo, and Sumatra, and is the typical representative of an aberrant group. But, as in Europe, the mountainous regions of India are far richer in species than the plains.

IV. AUSTRALIAN REGION.

This region presents us with a large number of small genera of restricted range, and with many remarkable forms of *Papilio* and other genera found also in the Indian region. We may mention as characteristic forms: *Ideopsis*, *Tellervo*, *Xenica* (Australia), *Tenaris*, *Hypolimnas* (also represented in other

regions), *Apaturina* (Amboina), *Mynes*, *Prothoe*, *Hypochrysops*, *Ogyris*, *Trapezites* (Australia), and *Hesperilla* (Australia). The great *Priamus* group of *Ornithoptera*, with its green, blue, and golden-yellow species, is entirely confined to this region, which, nevertheless, is rather poor in Butterflies, especially South Australia, Tasmania, and New Zealand, though these countries are very rich in remarkable genera of Moths.

V. NEARCTIC REGION.

See *Palæarctic Region* (*suprà*).

VI. NEOTROPICAL REGION.

It is no exaggeration to say that more than half the known Butterflies come from the Neotropical Region.

The whole of Mexico should probably be included in this region, but hardly Cuba, which has very strong affinities with Florida. Many of the species of the remaining larger West Indian islands, except those generally met with throughout Tropical America, have a peculiar character of their own, except Trinidad, which is zoologically part of Venezuela. Whole sub-families or even families of Butterflies are almost peculiar to Tropical America, such as the *Ithomiinæ*, *Brassolinæ*, *Heliconiinæ*, *Lemoniidæ* (except the *Libytheinæ* and a very few *Nemeobiinæ*), and a very large proportion of the *Hesperiidæ*, &c. Among a few of the more characteristic genera not included in the groups already mentioned we may notice, *Lymanopoda*, *Pronophila*, *Corades*, *Morpho*, *Cethosia*, *Dione*, *Clothilda*, *Cybdelis*, *Catonephele*, *Dynamine*, *Catagramma*, *Ageronia*, *Prepona*, *Megalura*, *Adelpha*, *Agrias*, *Anæa*, *Pereute*, *Archonias*, *Hesperocharis*, *Dismorphia*, *Perrhybris*, *Daptoneura*, *Euryades*, and whole sections of *Apatura*, *Papilio*, and other wide-ranging genera.

The Equatorial Regions, and especially Tropical America,

furnish an exception to the rule that mountainous regions are the richest in Butterflies. The marvellous exuberance and variety of the vegetation is such as to counterbalance the influence of mountains in stimulating variety; and the great river-valleys of South America are probably richer in species of Butterflies than any other part of the globe. But in the south, towards Buenos Aires and Chili, the number of species diminishes very rapidly, till it falls below the average European standard; and as we approach the extreme south of the Continent it is probable that the number of Butterflies dwindles even below the productiveness of Greenland.

It is a mistake to suppose that the Tropics are always rich in Butterflies, or that all tropical Butterflies are beautiful. In proportion to the productiveness of a country in a state of nature, is often its unproductiveness when cleared and cultivated. Not only are thousands of tropical Butterflies as small and dull-coloured as the most inconspicuous of our own, but the Indian representatives of European or Japanese species are often much inferior to the latter in both size and beauty.

On the Habits of East Indian Insects, especially Lepidoptera.

The following interesting paper, by the well-known Dutch collector, M. C. Piepers, was published in the "Proceedings of the Dutch Entomological Society," vol. 19. It is of so much interest that, by the kind permission of Mr. T. P. Newman, I am glad to place it on record in a more permanent form, by reprinting here my English translation, which appeared in the "Entomologist" for November, 1875.—The footnotes are my own.—(W. F. K.)

"When I collected our indigenous Butterflies in the neighbourhood of Arnhem many years ago, I observed that several

of the largest and finest species frequented the neighbourhood of clear running water. I considered the brooks on the estate of Mariendaal a good hunting ground, for I had already found so many fine specimens there that I always directed my steps thither again, sure that sooner or later I should again make some good capture.

"When, ten years later, I again took to the Butterfly-net in the East Indian islands, the same thing happened to me there also, only, as one who is accustomed to tropical climates would expect to find, on a much larger scale than in temperate regions. In these islands, where the clear mountain streams rush foaming over masses of rock, especially where the rivers flow swiftest and purest, down waterfalls, or near water broken by irregularities of the bed, the haunts of the great Butterflies are to be found, and there can one feel sure, when there is no want of sunshine, of seeing oneself surrounded by many forms of these children of the sun, whose number and beautiful colours would amaze the Northern collector. I say amaze, but his eye and mind would alike be ravished with the possession of the beauties of Nature, for nowhere does tropical nature show itself more dazzling than here, where in the twilight formed by the over-arching of the incredibly luxuriant tropical vegetation, due to the heat and damp, the mountain stream, in the fierce glare of the sun, rushes swiftly down like a broad shining silver streak, breaking through the darker hues of the bank, foaming and dashing spray over every rock in its path, which is covered at every turn with drops of water illumined by the sun into glittering jewels; while above and between, in perfect harmony with that life, splendour, and beauty of colour, the richly ornamented flying flowers, which we call Butterflies, flit to and fro.

"Why do we find Butterflies prefer such places? It is, perhaps, because they are, if I may so express it, of a thirsty

nature, and this although they prefer the very hottest sunshine, and even seem to find it so necessary that, if the sun is only clouded over for a minute, they settle as soon as possible; and if the sun should not shine—in the case of some individuals even if it should not shine very strongly—they never leave their hiding-place the whole day. I have seen some striking examples of this, one of which has, I think, never been recorded, and seems at first sight altogether to conflict with the idea that one is accustomed to form of the habits of Butterflies. Even in the Netherlands we may occasionally see Butterflies alight on damp sand, on which the sun is shining, to suck up moisture from the ground; but if, in the East Indian Islands, we walk along the sandy or gravelly bank of a mountain stream, or along the bed of a nearly dry stream, composed of similar materials, during the hottest part of the day, we shall disturb Butterflies at almost every step, especially *Papilionidæ* and *Pieridæ*, which sit there on the damp ground to refresh themselves with visible pleasure, but with wings closed so that they are scarcely discernible; and you suddenly see swarms of such Butterflies fluttering up into the air from before your feet. I was once travelling in South-west Celebes, when my companion suddenly exclaimed as we were crossing a nearly dry brook, 'Oh, look, what a beautiful flower!' And on looking where he pointed, I saw in the bed of the stream amongst the damp gravel, a beautiful orange-coloured flower with a white centre, about ten centimetres in diameter. The strangeness of the occurrence led me to step nearer in order to observe it more closely, when what did I see? The flower consisted of two concentric rings of Butterflies (*Callidryas scylla*, Linn.) which had closed their wings, which are yellow and orange beneath, and were busily sucking up the moisture from the damp sand, and thus represented in the most closely deceptive manner the petals of a flower. They surrounded five of another white species of

Pieris similarly occupied, which thus seemed to form the white centre of the flower. I still remember the amazement of my travelling companion when, on my nearer approach, the whole flower dissolved into a swarm of Butterflies.

"I afterwards saw another beautiful flower of the same kind, in which the petals were composed of a number of the red *Pieris zarinda*, Boisd., along with some yellow and white *Pieridæ*, in another part of South-west Celebes, in one of the above-mentioned places where Butterflies, especially *Papilionidæ* and *Pieridæ*, love to resort, just above the beautiful waterfall of Maros, which Wallace has described; and I saw there at the same time something which I never saw before or afterwards, and had never heard or read of before, for there I saw a Butterfly bathing.

"While I stood on the bank of the river, which forms at this spot an apparently still and very clear pool before entering the cleft in the rock from which it reappears as a foaming and thundering waterfall, a specimen of *Papilio helenus*, Linn., came flying over the water. Flying low, as is the habit of this species, it came within a short distance of me, when I saw it suddenly half close its wings, and dive down close beside me, so that the whole body and about a third of the wings, which slanted upwards, were immersed; it then raised itself again out of the water, and flew away. We cannot require stronger proof of the necessity of moisture to an insect which seems so little fitted for contact with water.

"Just as some plants in the East Indies choose the dryest localities parched up by the burning sun, so do some Butterflies select similar spots, such, for instance, as *Junonia orithya*, Linn., and without needing rest, enjoy settling on the scorching hot sand. And like other plants which choose very damp and deeply-shaded localities in the forest, where no ray of sunlight can penetrate, some *Satyrinæ* and other Butterflies,

usually of dark colour, love to haunt these dark and dripping nooks. Again, as the most beautiful and vigorous tropical vegetation is developed where the fiery heat of the sun is combined with great dampness, so do the largest and most brilliant Butterflies delight to frequent such places, where they rejoice in the sunshine, and also find the dampness which they so much need. It is worth mentioning that among these last Butterflies this is not due, as in other insects, to the peculiarity of their habits and surroundings, but the explanation is to be found either in the food of the perfect insect, or in its care for its offspring; so that it seems as if the nature of the larvæ which live on plants growing in warm and damp places, and in which the peculiarity of the nourishment does not seem to be without influence, also remains with the perfect insect, although it is no longer useful to it.

"At the same waterfall of Maros I witnessed another proceeding among Butterflies, which I think worth mentioning. It is known that male Butterflies, like most other animals, fight with each other from jealousy; but in other respects these insects are to be considered, as far as I know, very peaceable, and by no means quarrelsome creatures. I was, therefore, much astonished to observe the following incident: Around and over the blossoms of a flowering shrub flew several Butterflies, *Precis iphita*, Linn., and some *Pieridæ*, when a Butterfly of gigantic size in comparison with them (*Ornithoptera remus*, Cramer) came flying apparently with the object of sharing their repast. Whether the others were undesirous of the company of a guest among them whose appetite would be enormous, or not, it is certain that I saw them attack the *O. remus*, drive it away, and pursue it for a short distance, till it was evident that it had really taken to flight, when they returned to their flowers. I have often seen Swallows and other small birds drive away and pursue birds of prey which showed themselves

in the neighbourhood of their nests, in a precisely similar manner: they fly above the great enemy and suddenly drop down upon him, or peck him till he tires of the rapid and repeated attacks (against which his size and consequent lesser rapidity of flight hinder him from defending himself), and is forced to seek safety in flight, when his little enemies do not neglect to pursue him for a short distance. This reminds me that I have also read of similar attacks of Humming-birds upon American Sphinges, arising from jealousy about their food; but in the present instance, the assailants and victors were not birds provided with sharp-pointed beaks, but were apparently defenceless Butterflies.*

"Is it then, perhaps, throughout the insect world, "everyone for himself"; and are so many of the lovely winged beautifully clothed creatures, apparently so mild and defenceless, really vicious? It cannot be denied that this very rational behaviour leads us to think that Butterflies have more understanding than is generally supposed. I think the following incident will show that they are not deficient in memory. One evening I saw, in the open verandah of the Harmonic Society, at Manghasar, a specimen of a Butterfly which is very common there, *Precis iphita*, Linn. Notwithstanding the very strong illumination, this little creature remained sitting quietly in the same place on the ceiling during the whole evening. When I came to the Society next day I did not see it, but in the evening it was again sitting quietly in the same place. And as civilisation has not advanced so far in Manghasar that it is there considered necessary mercilessly to destroy or drive away every harmless creature which ventures into or near a human dwelling, I had the pleasure of admiring the memory of this *P. iphita* for six days. It was not to be found in the

* Some of the small European *Lycænidæ* will drive away larger Butterflies, which approach their favourite resting-places, in a similar manner.

mates, and where they touch the naked skin they leave an intolerable itching behind.* Besides, they dirty the white walls of the rooms everywhere by firmly attaching to them quantities of eggs covered with yellow down.†

"I now turn to caterpillars. I have often been surprised that in the East Indies, where there is so great a variety of Butterflies, so few caterpillars should be met with. My observations lead me to think that this is to be ascribed to the circumstance that probably a large portion of the Indian larvæ, as is the case with some in the Temperate Zones, avoid the light and heat of the day in the ground, and only visit the plants on which they feed at night; besides, as is also the case with tropical as compared with temperate plants, very few seem to be gregarious, at least I never found a great number of larvæ together, except those of *Bombya waringi*, Teysm., a number of whose larvæ I once met with on a young *Ficus benjaminia*, Linn.‡

"Among the larvæ which I had an opportunity of observing I noticed the important fact, long known in Europe, that some species seem to desert the plants on which their species originally fed, for imported plants, just as in the Netherlands the larvæ of *Acherontia atropos*, Linn., now seem to live by preference on the potato-plant, which was introduced from America, and cannot be excluded from it, so we find the very common larva of the equally common Butterfly, *Papilio agamemnon*, Linn., both in Batavia and South-west Celebes,

* In the case of the European Processionary Caterpillars, which possess the worst urticating properties of any in this quarter of the globe, it is also said that the hairs of the Moths, which they produce, are irritating. It would be interesting to know if the *larvæ* of M. Pieper's *Scirpophaga* are also urticating.

† This looks as if the Moth was not a *Scirpophaga*, but one of the smaller *Liparidæ*, a family which includes many highly urticating species.

‡ The caterpillars of several of the large *Saturniidæ* live gregariously on trees in Asia and Africa; and those of an African genus, *Anaphe*, of somewhat oubtful position, and its allies are also gregarious.

always feeding on the leaves of *Anana muricata*, Linn., a plant introduced from the West Indies. I also met with the larvæ of *Euplæa midamus*, Linn., feeding both on an indigenous plant and on the oleander, which was imported from Europe as an ornamental plant; and at Manghasar the larvæ of *Cyllo leda*, Linn., were not uncommon on the South American pampas grass, which I grew in my garden for horse fodder.

"Among East Indian larvæ I also observed the peculiar variations and resemblances, perhaps partly explicable by mimicry, but always remarkable, which occur among larvæ themselves. Some, apparently without any rule, which produce allied Butterflies, are very similar, while at other times those of species which resemble each other very closely (such as the European *Acronycta tridens*, Esp., and *A. psi*, Linn.), always exhibit great differences in their larvæ; and again other species which are very distantly related, are produced from larvæ which resemble each other very closely. The larvæ of the closely-allied *Papilio memnon* and *P. polytes*, Linn., differ only in size and in their food plant. The little arrow-head shaped larvæ of *Bombya waringi*, Teysm., which we have just mentioned, is exactly like a diminutive *Sphinx* larva, and the larvæ of the widely-separated *Amathusia phidippus*, Linn., and *Lasiocampa vishnou*, Guérin, though of very similar form, differ only in colour and food. Among the larvæ of *L. vishnou* I once saw something which never occurred to me at any other time; on the whole length of the back some specimens (for this larva varies extremely in colour and markings) showed a beautiful mark which appeared like a stripe embroidered with white and yellow floss-silk, while there was an abundance of white and yellow hairs along both sides of the larva. Shortly before they changed into pupæ, the white and yellow colour both of the stripes and of the long hair on the sides, changed to violet, without this being due to moulting.

"The hairs of the larva of *Miresa nitens*, Walker, figured by Herrich-Schäffer as *Setora nitens*, presented a still stranger appearance. When I met with this very beautiful larva it was completely covered with so-called spines. I counted eight large and twenty-four small ones. After a few days it moulted, without seeming to undergo any alteration in its external appearance. A few days later it moulted again, and now I saw the spines changed into tufts of hairs, some of which resembled stiff bristles, and others were more like pencils of hair. Three days later the hairs of these bristles united again, so that they seemed to form stiff spines as before the moulting; but three days later the hairs again divided, and the previous shape of bristles and pencils came back. After this the spiny shape did not return, but the same tufts of hair altered their shape daily, so that on one day they resembled bristles, and on another pencils; and this continued until the larva became a pupa.

"During my residence in the East Indies I busied myself chiefly with *Lepidoptera*, and I cannot, therefore, say much about insects of other Orders. But I cannot refrain from observing, though it is nothing new, how much stronger and more conspicuous insect life appears in the tropics than in temperate climates. The annoying pertinacity of the flies, which always return, however often driven away, is known to every inhabitant of the East Indies; and every housekeeper knows that no place of security is inaccessible to the innumerable ants. My watch stopped one night, and when I took it to the watchmaker he took a small ant from among the wheels, which had availed itself of the narrow opening left for the spring to work in, to squeeze itself into the watch, and taste the fine oil with which the works were lubricated. Almost every evening hundreds of small insects of all Orders find their death in every lamp; innumerable *Coleoptera* fly into lighted dwellings, whose nearest relations in the Temperate Zone also

possess wings, but very rarely use them, as well as a harmless but very troublesome *Gryllotalpa*, much dreaded by ladies, which much resembles *Sphinx convolvuli* in its reckless flight. Who has not been disturbed at supper-time in the East Indies by swarms of termites suddenly flying in and out, or still worse, by ill-smelling Orthoptera? or the intolerable itching caused by the species of *Lepidoptera* mentioned above? Who has not been compelled, by the ravages of termites in linen chest or library, to utter the socialistic wish that he had no private property? And above all, among those who cannot always remain in the better arranged dwellings of large towns, who does not remember those never-to-be-forgotten Indian nights, in which poets and lovers might have revelled, but when wearied men who wanted sleep were plagued by blood-sucking mosquitoes, crawling ants, and other insects, as if by actual demon-tormentors?

"Let me relate a single night's experience, which may serve as a small contribution to the still unknown life-history of an East-Indian insect. One night I was asleep at Batavia, thinking myself well protected by my mosquito-curtain, when I was awakened by a noise. On waking up, I heard a buzzing as if my room was turned into a great beehive. My night-light was extinguished, probably by the insects which I heard in my room having flown into it, but a little light from a gas-lamp coming through the window showed me the outside of my white mosquito-curtain covered with insects which seemed to be some sort of wasps. Of course I had no wish to leave my place of protection, but I soon saw that my mosquito-curtain was not so well closed as I had thought, and that some of the dreaded animals had already discovered the opening left by my carelessness. The only safety now lay in a determined resolution. I suddenly tore open the curtain, and threw my pillows so that I could jump upon them and reach the door

of the room without the danger of stepping with my bare feet on the wasps, which probably covered the floor of the room, and so I got out of it. I then called to my servants to bring a lighted candle. As soon as they saw the animals they declared that they did not sting, and handled them without fear. Thus reassured I went back to my room, and saw that it was filled with insects which appeared to have come up as full-grown winged ants from a hole between the stones of the floor. It is clearly the habit of these ants to live in the ground in their imperfect condition, and when perfect the winged specimens fly away. They thought little of the fitness of time and place when they ruthlessly disturbed my rest. It was nearly an hour and a half before they had all flown out to a light set outside the room to attract them. About a year afterwards the same thing happened in the same room. I sent the insect to the Netherlands, to the Leyden Museum, and it has since been determined by Ritsema to be *Dorylus klugii*, Hagen."

THE BUTTERFLIES AND MOTHS—ORDER LEPIDOPTERA.

THESE are also known as the Scale-winged Insects, and may be briefly diagnosed as follows :—

Haustellate insects, imbibing their food through a haustellum or proboscis ; wings four, clothed with scales ; transformations complete ; pupa inactive, without detached cases for the separate organs (except occasionally for the proboscis). Plant-feeders in all their stages.

THE BUTTERFLIES—LEPIDOPTERA RHOPALOCERA.

Flight diurnal, rarely, in certain tropical genera, crepuscular ; antennæ long, more or less thickened at the extremity, and often knobbed, sometimes hooked beyond the knob ; front legs often imperfectly developed, especially in the males ; wings without a connecting bristle, or frenulum ; pupa rarely enclosed in a cocoon.

Before proceeding to consider the various families and genera of Butterflies, we will briefly outline some of the more important of the various systems of classification which have been proposed, referring to the Introduction for all other necessary general information respecting *Lepidoptera*.

Although many writers of the seventeenth and eighteenth

centuries, and even earlier, published important observations on Butterflies and Moths, the real foundation of our present classification was laid down by Linnæus in 1758, in the tenth edition of his "Systema Naturæ" (vol. i., p. 458). It is as follows:—

LEPIDOPTERA.

Alæ IV. imbricatæ squamis.
Os. Linguæ involuta spirali.
Corpus. pilosum.
Papilio. Antennæ apicem versus crassiores, sæpius clavato-capitatæ.
Alæ (sedentis) erectæ, sursumque conniventes (volatu diurno).

Papiliones dividuntur in VI. phalanges.

a. Equites. Alis primoribus ab angulo postico ad apicem longioribus, quam ad basin, his sæpe. Antennæ filiformes.
— Trojani. ad Pectus maculis sanguineis (sæpius nigri).
— Achivi. Pectore incruento, ocello ad angulum ani.
— — Alis absque fasciis.
— — Alis fasciatis.

b. Heliconii. Alis angustis integerrimis striatis; primoribus oblongis; posticis brevissimis.

c. Danai. Alis integerrimis.
Candidi. Alis albidis.
Festivi. Alis variegatis.

d. Nymphales. Alis denticulatis.
Gemmati. Alis ocellatis.
Ocellis in alis omnibus.
— — — primoribus.
— — — posticis.
Phalerati. Alis cæcis absque ocellis.

e. Plebeii parvi. Larva sæpius contracta.
Rurales. Alis maculis obscurioribus.
Urbicolæ. Alis sæpius maculis pellucidis.

f. Barbari. Corollarii in loco adjecti, ad ordinem non relati.

Many writers argue that our nomenclature should commence from the twelfth edition of Linnæus' "Systema Naturæ" (1767)* and not the tenth; but the Linnean system was fully established in the tenth edition, and was adopted by most authors of repute between 1758 and 1767. No alterations of much importance were made in the twelfth, nor can even Linnæus' own species be satisfactorily identified without reference to works published by himself and others in the interim. Hence the tenth edition is now regarded by most entomologists as their starting-point. With respect to Butterflies, the only alterations of importance in the twelfth edition are the suppression of the section *Papiliones Barbari*, the species which it contained being distributed among the other sections; and the substitution of the words "sæpe denudatis" for "integerrimis striatis" in the definition of the *Heliconii*. Fabricius afterwards gave the name *Parnassii* to the section indicated by the words "sæpe denudatis."

The Linnean genus *Papilio*, applied by him in his earlier works to the whole of the *Lepidoptera*, and in 1758 and subsequently to the whole of the Butterflies, was soon subdivided by later authors into smaller genera, and the systems in vogue in France and Germany differed somewhat. Thus we find Ochsenheimer in 1816 arranging the European genera of

* This is the rule laid down by the British Association, but as exceptions were admitted, it is not always considered absolutely binding. The year 1766 is the date of the first volume of the "Systema"; but the part relating to insects is dated 1767. The eleventh edition (1760) is merely a re-print of the tenth.

Butterflies as follows ("Schmetterlinge von Europa," Band iv.):—

Melitæa.	Lycæna.
Argynnis.	Papilio.
Euplœa.	Zerynthia.
Vanessa.	Doritis.
Limenitis.	Pontia.
Charaxes.	Colias.
Apatura.	Hecaerge.
Hipparchia.	Hesperia.

It will be noted that, while Linnæus in 1758 placed the Butterflies with imperfect front legs in the middle of his arrangement, Ochsenheimer and many other German authors put them at the commencement of their systems. This arrangement had actually been employed by Linnæus himself in some of his earlier works.

The arrangement of genera adopted by Latreille and Godart in 1819–1823 in the ninth volume of the "Encyclopédie Méthodique," is as follows:—

DIURNA.

Papilionides.	Biblis.
Papilio.	Nymphalis.
Parnassius	Morpho.
Thais.	Brassolis.
Colias.	Eurybia.
Pieris.	Satyrus.
Libythea.	Erycina.
Danais.	Myrina.
Idea.	Polyommatus.
Cethosia.	Barbicornis.
Heliconia.	*Hesperides.*
Acræa.	Urania.
Argynnis.	Hesperia.
Vanessa.	

Many authors divide the Lepidoptera into three sections, Diurna, Crepuscularia, and Nocturna, according to the times of flight of the majority of the species which they include. The Diurna correspond to the Rhopalocera, or Butterflies.

We may here remark that *Urania* is now regarded by all entomologists as belonging to the Moths.

Boisduval's system ("Species Général des Lépidoptères," tome i., 1836) is more extended, and is based primarily on the mode of attachment of the pupa.

RHOPALOCERA.

Succincti.
- Papilionides.
- Pierides.
- Eumenides.
- Lycænides.
- Erycinides.
- Peridromides.

Suspensi.
- Danaides.
- Heliconides.
- Nymphalides.
- Brassolides.
- Morphides.
- Satyrides.
- Biblides.
- Libytheides.

Involuti.
- Hesperides.

The arrangement of families employed by Doubleday and Westwood (1846–1852) in their "Genera of Diurnal Lepidoptera" is a modification and amplification of Boisduval's scheme.

- Papilionidæ.
- Pieridæ.
- Ageronidæ.
- Danaidæ,
- Heliconidæ.
- Acræidæ.
- Nymphalidæ.
- Morphidæ.
- Brassolidæ.
- Eurytelidæ.
- Satyridæ.
- Libytheidæ.
- Erycinidæ.
- Lycænidæ.
- Hesperidæ.

The *Ageronidæ* were raised to the rank of a distinct family through an error regarding their metamorphoses, and are now included in the *Nymphalidæ*. The *Eurytelidæ* (except the genus *Elymnias*, which is either referred to the *Satyridæ*, or regarded as a distinct family or sub-family), and even the *Morphidæ*, are also merged in the *Nymphalidæ* by some authors, but all the other groups are still generally recognised, either as families or sub-families.

Bates, in a series of papers published from 1862 to 1866, argued that the Butterflies with imperfect front legs should be placed first in the arrangement, as being furthest removed from the Moths; and his views have been adopted by most recent English and American Lepidopterists. Except that I retained the *Elymniinæ* and *Morphinæ*, which Bates was inclined to unite with the *Nymphalinæ*, as separate sub-families, and that one or two names are changed, the arrangement which I employed in my "Synonymic Catalogue of Diurnal Lepidoptera" (1871), is nearly the same as that of Bates:—

I. Nymphalidæ.
Sub-fam. 1. Danainæ.
„ 2. Satyrinæ.
„ 3. Elymniinæ.
„ 4. Morphinæ.
„ 5. Brassolinæ.
„ 6. Acræinæ.
„ 7. Heliconinæ.
„ 8. Nymphalinæ.

II. Lemoniidæ.
Sub-fam. 1. Libythæinæ.
„ 2. Nemeobiinæ.
„ 3. Euselasiinæ.
„ 4. Lemoniinæ.

III. Lycænidæ.

IV. Papilionidæ.
Sub-fam. 1. Pierinæ.
„ 2. Papilioninæ.

V. Hesperidæ.

The following summary shows the gradual increase in our knowledge of the species of Butterflies:—

		Species.
1758.	Linnæus	192
1767.	„	273

		Species.
1775.	Fabricius	406
1793.	„	1147
1823.	Latreille and Godart	1802
1852.	Doubleday and Westwood... ...	3451*
1871.	Kirby	7695

Since the appearance of my "Synonymic Catalogue of Diurnal Lepidoptera" in 1871, enormous progress has been made in the study of Butterflies, which I think I may fairly claim to be in a great measure due to the publication of the above-mentioned work. But authors differ much in their views as to varieties and species, and a considerable number of absolute synonyms doubtless remain to be eliminated. Hence I cannot attempt to estimate the actual number of species now known to entomologists. It should, however, be remembered that while in some genera the number of known species has been far more than doubled since 1871, in others the number has remained almost stationary.

In 1884–1888 Dr. Staudinger published his "Exotische Tagfalter," an important work in small folio, with 100 coloured plates of Butterflies. His arrangement is that of Doubleday and Westwood, omitting the families *Ageronidæ*, *Eurytelidæ*, and *Libythæidæ*.

A companion volume, commenced by Dr. Schatz, and completed, after his death, by Dr. Röber, appeared from 1885 to 1892, and included a most careful revision of all the genera of Butterflies, except the *Hesperidæ*. This is illustrated by diagrams of the neuration of every genus, and generally of the legs, palpi, and antennæ also. It is much to be wished that some enterprising publisher would venture to issue these valu-

* This estimate is too high, including many species named but not described, and various duplicate entries of sexes, &c.

able works in English for the benefit of the numerous entomologists in England and other English-speaking countries, who may not read the German language.

The system of families adopted by Schatz is as follows :—

A. Six perfect legs in both sexes; pupæ attached by the tail, and a cross-band.

FAM. I. PAPILIONIDÆ.

a. Front legs with a spine on the tibiæ; claws simple; inner margin of the hind-wings concave, not embracing the body; sub-median nervure of the fore-wings with a short branch at the base of the wings.

FAM. II. PIERIDÆ.

b. Front tibiæ with no spine; claws bifid; inner margin of the hind-wings not concave, but embracing the body when at rest; sub-median nervure not branched, but often forked at the base.

B. Four perfect legs in both sexes; front legs aborted, the tarsi in the male with but one joint, in the female generally with five; claws absent in both sexes; pupa suspended by the tail.

FAM. III. DANAIDÆ.

c. Larvæ smooth, provided with long fleshy appendages; submedian nervure of the fore-wings forked at the base; front legs of female with the tarsi thickened; wing-cells closed.

FAM. IV. NEOTROPIDÆ.

d. Larvæ covered with small elevations; sub-median nervure of the fore-wings forked at the base; front legs of female with long and slender tarsi; wing-cells closed.

FAM. V. ACRÆIDÆ.

e. Larvæ furnished with branching spines; sub-median nervure of fore-wings not forked; median nervure not hooked at base; palpi thick, surrounded by separate hairs; wing-cells closed.

FAM. VI. HELICONIIDÆ.

f. Larvæ provided with branching spines; sub-median nervure of fore-wings not forked; median nervure with a short hook at the base; palpi compressed, with scales on the sides, and covered with hair in front; cells closed.

FAM. VII. NYMPHALIDÆ.

g. Larvæ smooth or spiny; cells of both wings, or at least of the hind-wings, open, or, if closed, with a slender rudimentary (not tubular) nervure.

FAM. VIII. MORPHIDÆ.

h. Larvæ smooth or hairy, with a forked tail; cells of the fore-wings closed, those of the hind-wings open.

FAM. IX. BRASSOLIDÆ.

i. Larvæ generally with a forked tail; hind-wings with the cells closed, and a distinct pre-costal cell.

FAM. X. SATYRIDÆ.

j. Larvæ smooth, with a forked tail; wing-cells closed; palpi compressed, set with long bristly hairs.

C. Four perfect legs in the male; front legs aborted, with the tarsi consisting of a single joint, without claws.

Six perfect legs in the female; front legs considerably smaller than the others.

FAM. XI. LIBYTHÆIDÆ.

k. Larvæ smooth; pupæ suspended by the tail; palpi very large, beak-shaped.

FAM. XII. ERYCINIDÆ.

l. Larvæ various; pupæ stiffly raised, or resting on a leaf, or even suspended; palpi normal.

FAM. XIII. LYCÆNIDÆ.

D. Four perfect legs in the male, the front legs aborted, tarsi ending in a horny point, densely spined on the inner side.

Six perfect legs in the female, the front legs smaller than the others.

FAM. XIV. HESPERIDÆ.

E. Six perfect legs in both sexes; tibiæ of the hind legs (with a few exceptions) spined; pupæ attached by threads, or enclosed in a loose cocoon.

The careful study which Schatz and Röber have devoted to the Butterflies has led to much improvement in the arrangement of genera, though I do not agree with all their conclusions.

In the first volume of the present work I treat of the *Nymphalidæ* in their broad sense, *i.e.*, Schatz' "Section B," for I cannot ignore the many characters which seem to ally the *Papilionidæ* with the *Hesperidæ* ("Sections A and E" of Schatz), and while adopting the sequence of families in his "Section B," I prefer to treat them as sub-families.

FAMILY I. NYMPHALIDÆ.

Egg.—Very variable in shape and texture.

Larva.—Cylindrical, often hairy, or furnished with branching

spines; sometimes smooth, with horns on the head, and a forked tail.

Pupa.—Generally suspended by the tail, often more or less metallic; very rarely found on the surface of the ground.

Imago.—Of large or moderate size, rarely small; if slenderly formed, generally with rather long wings; colours very varied; wings often marked with ocellated spots, especially on the under surface. Front legs in both sexes much smaller and weaker than the others, those in the male with only one or two tarsal joints, occasionally obsolete; those of the female usually with four or five joints.

SUB-FAMILY I. DANAINÆ.

Egg.—Much higher than wide, leathery, radiate, with numerous broad flattened ribs and distinct cross-lines, reticulate over a small area at the apex.

Larva.—Smooth, with long fleshy appendages, feeding chiefly on *Aristolochiæ*.

Pupa.—Short, stout, often metallic.

Imago.—Of large size; basal joint of palpi short; wings always ample, generally long, sometimes very broad and rounded, the wing-cells closed; sub-median nervure of the fore-wings forked at the base; wings generally entire, sometimes slightly scalloped, but never tailed. Male with conspicuous patches of raised scales on various parts of the wings, and in many species with conspicuous anal tufts of hair; female with flattened, club-shaped tarsi.

NOTE.—This group was divided by Mr. Moore, in the "Proceedings of the Zoological Society of London" for 1883, into a great number of genera, of which we have only space to mention a few of the most representative.

Range.—The *Danainæ* are most numerously represented

in the tropics of the Old World, but a few species inhabit America. The only species which is indigenous to Europe is *Limnas chrysippus* (Linn.). It is common throughout Africa and the East Indies, and its range extends to Greece. Besides this, however, the North American *Anosia menippe* (Hübner),* one of the largest species of the group, and an extremely abundant insect, which migrates north to Canada, has lately spread over the whole of the Pacific Islands, and has probably now reached the mainland of Asia. When once firmly established on the Asiatic continent, its extension throughout the warmer parts of Asia and Europe and the whole of Africa can only be a question of a comparatively short time. Not only so, but many specimens have already been taken in England, and it is now regarded as almost naturalised, though it is still doubtful whether it will find sufficient appropriate food to enable it to establish itself permanently with us. Its larva feeds on various species of *Aristolochia*, called "Milk-weeds" in the United States, and most of the known larvæ of the *Danainæ* feed on *Asclepias* and allied plants.

Habits.—As already noticed, *Anosia menippe* is an insect of powerful flight and migratory habits, but many *Danainæ* have a lazy flapping flight, and are very restricted in their range, the species found in adjacent islands being often different from each other.

NOTE.—The *Danainæ* are remarkable for being a highly-protected group of Butterflies. They have a peculiar odour, dependent, it is believed, on the anal tufts of hair, which render them distasteful to birds; and it has even been asserted that mites will not touch them in collections. Their integuments, too, are very tough, and hence, even if attacked by birds, they might easily escape fatal injury. They exhibit the phenomenon known as "mimicry" to perfection; that is to say, various other Butterflies and Moths, having no real affinity to them, resemble them so closely as to be frequently

* Usually called *Danaus plexippus* or *D. archippus*; but it is not the true *P. plexippus* of Linnæus, nor the true *P. archippus* of Cramer.

indistinguishable on a superficial examination; and it is believed that these species share, more or less, in the immunity from danger, of the Butterflies which they resemble. It is not uncommon for the female only of the mimicking species to resemble its model, the male being totally different.

The *Danainæ* are also remarkable for the possession of masses of raised scales on various parts of the wings of the males. In the species allied to *Euplœa* these usually consist of "brands," or long dark streaks on the fore-wings, and a large patch on the costa of the hind-wings. In those allied to *Danaus* they usually consist of a patch of raised scales on the disc of the hind-wings. These tufts conceal the peculiar scales formerly called "plumules," but now "androconia," and are scent-producing organs. They are, of course, secondary sexual characters, and probably not protective, except, perhaps as a casual subsidiary function. These scaly patches are not present in the males of every species, and of late years these Butterflies have been divided into a great number of genera (which we have no space to notice in detail), according to the presence or absence of these sexual markings, combined with differences in the neuration, &c., and the number of fleshy filaments in such of the larvæ as are known. But most of these sections are at present regarded as groups, rather than as genera, by the majority of entomologists.

GENUS HESTIA.

Hestia, Hübner, Verz. bek. Schmett., p. 15 (1816); Doubl., Gen. Diurn. Lepid. p. 94 (1847); Moore, Proc. Zool. Soc. Lond., 1883, p. 217; Schatz, Exot. Schmett., ii., p. 80 (1886).

The type is:—

HESTIA LYNCEA.

Papilio lynceus, Drury, Illustrations of Exotic Entomology, ii., pl. 7., fig. 1 (1773).

Idea lyncea, Godart, Enc. Méth., ix., p. 195, no. 2 (1819).

1. *Hestia idea.*
2. *Ideopsis daos.*

Our representative of this group of genera is—

HESTIA IDEA.

(*Plate IV., Fig.* 1.)

Papilio idea, Clerck, Icones, pl. 38, fig. 1 (1764); Linnæus, Syst. Nat. (ed. xii.), i., pt. 2, p. 758, no. 73 (1767); Cramer, Pap. Exot., iii., pl. 193, figs. A., B. (1767).

Idea agelia, Godart, Encycl. Méth., ix., p. 195, no. 1 (1819).

This species is now regarded by the authors who subdivide *Hestia* as the type of the genus *Nectaria*. It is a native of the islands of Amboina and Ceram. Our figure represents this species of half the natural size. There are so many allied forms that a detailed description cannot be given.

GENUS IDEOPSIS.

Ideopsis, Horsfield & Moore, Cat. Lep. Mus. E. Ind. Comp., i., p. 333 (1857); Schatz, Exot. Schmett., ii., p. 80 (1886).

This genus derives its name from the resemblance of *I. daos* (Boisduval) to *Hestia idea* (Clerck); but the species of *Ideopsis* are smaller than those of *Hestia*, and have the club of the antennæ more distinctly thickened. Some species of *Ideopsis*, however, have more pointed brown wings, with the hind-wings and the disc of the fore-wings of a slightly transparent grey or yellow.

IDEOPSIS DAOS.

(*Plate IV., Fig.* 2.)

Idea daos Boisduval, Spec. Gén. Lépid., i., pl. 24, fig. 3 (1836).

The true *Ideopsis daos* is a native of Borneo. I abstain from quoting more synonymy, as it is still uncertain whether some of the Butterflies from South China, Malacca, Sumatra, &c., which are usually referred to *I. daos* may not be distinct species.

GENUS LIMNAS.

Limnas, Hübner, Tentamen, p. 1 (1810?); Moore, Proc. Zo
Soc. Lond., 1883, p. 237.

Type, *Papilio chrysippus* (Linn.), from the tropical and su
tropical regions of the Old World.

This section of the old genus *Danaus* much resembl
Danaus plexippus (Plate v., fig. 2) in size, colour, and marking
but wants the thickened black veins so conspicuous in th
species. The larva differs in having the four hinder filamen
much longer, though the front pair are the longest.

LIMNAS CHRYSIPPUS.

Papilio chrysippus, Linn., Syst. Nat. (ed. x.), i., p. 471, no. 8
(1758); id., Mus. Ludov. Ulr., p. 263 (1764); Crame
Pap. Exot., ii., pl. 118, figs. B., C. (1777); Hübn., Euro
Schmett., i., figs. 678, 679 (1803).

Danais chrysippus, Horsf. & Moore, Cat. Lep. E. I. Mus.,
p. 126, pl. iv., figs. 7, 7a (transf.) (1857); Trim., Rho
Afr. Austr., pp. 88, 333, pl. 1, figs. 3, 3a (transf.: 1862
1866); id., S. Afr. Butterflies, i., p. 51 (1887); Dis
Rhopal. Malay., p. 20, pl. 1, fig. 10 (1882); Marsh.
De Nicéville, Butterflies Ind., i., p. 50, pl. 6, fig. 10 (1882)
Lang, Butterflies Eur., p. 226, pl. 54 (1883).

Salatura chrysippus, Moore, Lepid. Ceylon, i., p. 7, pl.
(1880: transf.).

Anosia chrysippus, Semper, Reisen Philipp. Lepid., i., p. 16, p
A, figs. 2, 2a (1886: transf.).

Limnas chrysippus, Moore, Lepid. India, i., p. 36, pl. 8 (1890
transf.).

Danaus chrysippus, Kirby, Eur. Butterflies & Moths, p. 26
pl. 11, fig. 5 (1878).

Var. α. *Limnas alcippus.*

Papilio alcippus, Cram., Pap. Exot., ii., pl. 127, figs. E., F. (1777).

Var. β. *Limnas dorippus.*

Euplœa dorippus, Klug, Symbolæ Physicæ, pl. 48, figs. 1–4 (1845).

This is a reddish-coloured Butterfly, having the wings black, bordered and spotted with white. The apex of the fore-wings is broadly black, crossed by a white bar of confluent spots, near which are several smaller ones. The discoidal cells of the hind-wings are surrounded by three black spots (or four, in the male, the sexual mark resembling an additional spot).

This Butterfly is common all over Africa and Southern Asia, and is likewise found in Greece. Many years ago it appeared near Naples, having apparently been introduced, but it failed to establish itself permanently.

The larva is bluish-grey, with yellow dorsal and lateral stripes, and transverse black lines. As in many allied species, the filaments are black, with the base red. The pupa is green or pink, with golden spots.

Several constant forms allied to this Butterfly, with more or less white hind-wings, are met with (*e.g.*, *L. alcippus*, Cramer, &c.) most commonly in Africa. Another allied form is *L. dorippus* (Klug), in which the reddish-tawny ground-colour obliterates the black and white markings towards the apex of the fore-wings. Other forms have been named *L. alcippoides*, Moore, *L. klugii*, Butler, &c. Until these forms have been carefully bred from the same batch of eggs we cannot positively affirm that they are distinct species, or the opposite. A smaller insect, *L. petilia* (Stoll), closely allied to *L. chrysippus*, is found in Australia.

There is probably no insect which has so many mimics as *L. chrysippus*. Among the mimics are the females of *Hypolimnas*

misippus (Linn.), *Argynnis niphe* (Linn.), *Papilio cenea* (Stoll), and (in both sexes) *Euphædra elea* (Drury), and various species of Moths belonging to the genera *Phægorista*, *Aletis*, &c. The closest of these mimics is the female of *Hypolimnas misippus*, which, however, can be easily recognised, *inter alia*, by the more festooned outline of the hind-wings and the want of the black spots in the centre. The male is a black insect, with a large bluish-white spot on each wing. The other forms to which we have alluded, *D. alcippus*, *D. dorippus*, &c., are likewise more or less mimicked by corresponding forms of other Butterflies. It is remarkable that although the female of *Argynnis niphe* (Linn.), a common Indian species, mimics *L. chrysippus*, the closely-allied Australian *A. inconstans* (Butler), has a female which resembles the male, notwithstanding the presence in Australia of *L. petilia*, a closely allied representative of *L. chrysippus*.

GENUS DANAUS.

Papilio. Danaus, Linn., Syst. Nat. (ed. x.), pp. 458, 468 (1758).
Danaida, Latr., Hist. Nat. Crust. Ins., xiv., p. 108 (1805).
Danaus, Latreille, Gen. Crust. Ins., iv., p. 201 (1809).
Danais, Latr., Enc. Méth., ix., pp. 10, 172 (1819); Doubleday, Gen. Diurn. Lepid., p. 89 (1847): Butler, Proc. Zool. Soc. Lond., 1866, pp. 43, 171; Schatz, Exot. Schmett., ii., p. 78 (1886).
Salatura, Moore, Proc. Zool. Soc. Lond., 1883, p. 239.

Linnæus gave the names *Danai candidi* and *Danai phalerati* to the groups now known as *Pierinæ* and *Danainæ*, naming most of the species of the two groups after the sons and daughters of Danaus. The older authors, such as Fabricius and Esper, proposed to restrict the name to the *Pierinæ*, in which case *Pieris brassicæ* should probably be regarded as the type; but Latreille first used the genus in a strictly generic sense under the names *Danaida* and *Danais*, specifying

D. plexippus as the type. It appears best to use the original Linnean form *Danaus*, and to associate it with male mythological names, included among his *Danai* by Linnæus; on the principle that a species should agree in gender with its genus.

DANAUS PLEXIPPUS.

(*Plate V., Fig.* 1.)

Papilio plexippus, Linn., Syst. Nat. (ed. x.), p. 471, no. 80 (1758); id., Mus. Ludov. Ulr., p. 282 (1764).

Danais plexippe, Godart, Encycl. Méth., ix., p. 186, no. 35 (1819).

Danais plexippus, Horsf. & Moore, Cat. Lepid. E. I. C. Mus., i., p. 124, pl. 4, figs. 6, 6a (transf.) (1857).

Papilio genutia, Cramer, Pap. Exot, iii., pl. 206, figs. C., D. (1779).

Danais genutia, Marsh. & De Nicév. Butterflies Ind., i., pp. 7, 52 (1882); Dist. Rhopal. Malay., p. 18, pl. 2, f. 2 (1882).

Salatura genutia, Moore, Lepid. Ceyl., i., p. 6, pl. 4, fig. 2 (1880); id., Lepid. Ind., i., p. 45, pl. 10, figs. 1, 1a–c (1890).

This insect, which is the type of its genus, is a handsome Butterfly, measuring three or four inches across the wings, which are tawny, or fulvous, with black nervures, and black borders, spotted with white. The apical third of the fore-wings is black, crossed by a broad white bar, divided into spots by the nervures The head and thorax are black, dotted with white, and the abdomen is tawny, like the wings. It is a common insect in India, and is found in fields and gardens, as well as in woods. The larva is black, with white and yellow markings, and three pairs of filaments; the pupa is bright green.

Linnæus confounded this species with the North American *Anosia menippe* (Hübner), and this Butterfly is often regarded as the true *Danaus plexippus* (Linn.); but Linnæus describes his

species as having a white band on the fore-wings like *Lim-chrysippus*, a character not found in any American Butterfly this group.

GENUS TIRUMALA.

Tirumala, Moore, Lepid. Ceylon, i., p. 4 (1880); id., Zool. Soc. Lond., 1883, p. 232.

TIRUMALA LIMNIACE.

(*Plate V., Fig. 2.*)

Papilio limniace, Cramer, Pap. Exot., i., pl. 58, figs. D. (1775).

Danais limniace, Godart, Encycl. Méth., ix., p. 191, no. 49 (18 Marsh. and De Nicév., Butterflies Ind., i., p. 4, pl. 1, (1882); Staud., Exot. Schmett., i., p. 49, pl. 24 (188

Tirumala limniace, Moore, Lepid. Ceylon, i., p. 4, pl. 1, (1880).

Tirumala limniace, Moore, Lepid. Ind., i., p. 30, pl. 6, 1a, 1b (1890: transf.).

We have figured this common East Indian and African as the representative of an extensive group of species placed in the genus *Danaus*, but now divided into genera), which are of a brown colour, streaked and spotted green or blue. A nearly allied species to *T. limniace* is the tralian Butterfly, *T. hamata* (Macleay), to which some have erroneously applied the accounts given by travel

1. Danaus plexippus.

2. Tirumala limniace.

third segment, and a short pair on the twelfth. The pupa is green, with scattered golden dots.

GENUS AMAURIS.

Amauris, Hübner, Verz. bek. Schmett., p. 14 (1816); Moore, Proc. Zool. Soc. Lond., 1883, p. 226; Schatz, Exot. Schmett., ii., p. 83 (1886); Trimen, South African Butterflies, i., p. 56 (1887).

Danais, Sect. 1, Doubleday, Gen. Diurn. Lepid., p. 89 (1847).

Type *Papilio niavius* (Linn.), from West Africa.

AMAURIS NIAVIUS.

Papilio niavius, Linn., Syst. Nat. (ed. x.), i., p. 470, no. 76 (1788); id., Mus. Ludov. Ulr., p. 253 (1764); Clerck, Icones, pl. 32, f. 2 (1764); Cramer, Pap. Exot., i., pl. 2, figs. F., G. (1775).

Danais niavia, Godart, Enc. Méth., ix., p. 182, no. 22 (1819).

A large black species, over three inches in expanse, with large bluish-white sub-apical spots on the fore-wings, and a great part of the hind-wings filled up with the same colour. It is a West African insect, its South African representative (*A. dominicanus*, Trimen) being larger, with more extended white markings.

Amauris is a genus of small extent, entirely confined to Tropical and Southern Africa. The species are of moderate size (two to four inches across the wings), and are of a rich dark brown, with white or ochreous spots. We have figured a species belonging to the closely-allied genus or sub-genus *Nebroda* (Moore), lately described from Matabele Land by Miss Emily M. Sharpe, and named after the barbarous but unfortunate king of that country. It differs from the common South African *N. echeria* (Stoll) by the great extent of the pale central part on the hind-wings.

Mr. Trimen describes the larva of *N. echeria* as having five pairs of divergent sub-dorsal filaments. It is black, with blue and orange longitudinal stripes. The perfect insect has a rather high, graceful, soaring flight, presumably somewhat like that of *Hestia*.

The species of *Amauris* and its allies are mimicked by various species of *Papilio*, *Hypolimnas*, &c., found in the regions which they inhabit; but these can at once be distinguished from them by differences in the neuration, &c.

NEBRODA LOBENGULA.

(*Plate VI*, *Fig.* 1.)

Nebroda lobengula, E. M. Sharpe, Ann. and Mag. Nat. Hist. (6), vi., p. 34 (1890).

Nearest to *N. echeria*, Stoll (*Amauris echeria*, Kirby, Syn. Cat. Lepid., p. 8), but differing in the much greater extent of yellow on the hind-wing. There is a row of unequal yellow spots on the hind marginal border, extending to the sub-median nervure. The base of the hind-wing is deep brown.

The fore-wing has a moderately large yellowish spot in the middle of the discoidal cell, with a second larger oval spot between the first and second median nervules.

Between the radial or discoidal nervules there are two medium-sized yellowish spots near the apical portion. At the apex of the fore-wing there is a row of small white spots extending to the hind margin, with four smaller white spots outside the first row of spots, placed about the middle of the fore-wing. Along the costal margin there are two white spots. The under side of the fore-wing is of a lighter brown, having all the spots plainly marked in white with the exception of the two larger spots, which are yellow.

The hind-wing is similar to the fore-wing, having the yellow basal area quite as dark as on the upper side, and the

spots are white, while near to the pre-costal nervure there is one small white spot.

Exp., 3·1 inches.

Hab.—Matabele Land to Nyasa Land.

This species has recently been obtained in Nyasa Land by Mr. H. H. Johnston, and from one of his specimens in the British Museum the figure has been taken.

GENUS EUPLŒA.

Euplœa, Fabr. in Illiger's Mag., vi., p. 280 (1807); Doubl., Gen. Diurn. Lepid., p. 86 (1847); Butl., Proc. Zool. Soc. Lond., 1866, p. 268; Moore, *op. cit.*, 1883, p. 288; Schatz, Exot. Schmett., ii., p. 80 (1886).

Macroplœa, Butler, Journ. Linn. Soc., Zool., xiv., p. 292 (1878); Moore, Lepid. Ceylon, i., p. 9 (1880).

The type is

EUPLŒA CORUS.

Papilio corus, Fabricius, Ent. Syst., iii., pt. 1, p. 41, no. 122 (1793).

Euplœa elisa, Butler, Proc. Zool. Soc. Lond., 1866, p. 270, no. 4; Marsh. & De Nicéville, Butterflies Ind., i., p. 72, pl. 8, fig. 14 (1882).

Macroplœa elisa, Moore, Lepid. Ceylon, i., p. 9, pl. 5, fig. 2 (1880).

Euplœa corus, Moore, Lepid. Ind., i., p. 107, pl. 37, figs. 1, 1a, 1b. (1890; transf.).

This is a large brown species from Ceylon, measuring over four inches across the wings, on which are several rows of sub-marginal white spots. The fore-wings in this genus are rather long, and the hind-margins are gradually curved on all

the wings, so that Mr. Butler has named one of them *E. semicirculus.*

The species which were formerly included in *Euplœa*, but have lately been divided into several genera, are numerous in the Indian and Austro-Malayan Regions, but are very sparingly represented in Madagascar and the adjacent islands. They do not extend to America or Europe, nor apparently even to the mainland of Africa. Their wings are always rounded and entire, never angulated or dentated; sometimes long, but sometimes so broad as to be almost round. They are generally of a brown colour, with more or less extensive white, blue, or tawny spots, and are often flushed with rich blue. The larvæ much resemble those of *Danaus*, &c., and are similarly provided with fleshy filaments.

An American writer gives an odd description of a black, white-spotted species from New Guinea (*E. papuana*, Reakirt). On the fore-wings there is "a submarginal row of seven chalk-white spots, ... there are three minute dots, near the margin, obliquely below the fourth, fifth, and sixth spots *respectfully!*"

The rows of white or bluish spots above alluded to are very frequent in this genus, and are sometimes arranged in rows parallel to the hind margin, and sometimes in an irregular circle about the middle of the wings, especially on the under surface.

The species of *Euplœa* are mimicked by various species of *Papilio*, *Hypolimnas*, *Elymnias*, &c., and by several Moths belonging to the family *Chalcosiidæ.*

GENUS HIRDAPA.

Hirdapa, Moore, Proc. Zool. Soc. Lond., 1883, p. 299.

Type, *Euplœa usipetes*, Hewitson.

The only species belonging to the old genus *Euplœa* for

which we could find room on our plates is the recently-described *Hirdapa rezia*, Kirby, which belongs to a genus differing much in shape from the more typical representatives of *Euplœa*.

The genus *Hirdapa* is thus characterised by Mr. Moore.

"Male with short, very broad, fore-wing; costa much arched; apex acute; exterior margin long, slightly oblique, and curved; hind margin deeply convex towards the angle; cell very broad; upper discocellular slightly concave, lower outwardly oblique; lower median and sub-median very wide apart, sub-median very recurved, with a very short broad sericeous brand. Hind-wings very broadly oval, exterior margin oblique; cell broad, with a large pale ochreous glandular patch."

HIRDAPA REZIA.

(*Plate VI., Fig.* 2.) (♀.)

Hirdapa rezia, Kirby, Ann. & Mag. Nat. Hist. (6), vol. xiii., p. 166 (Feb., 1894).

Exp., ♂ $2\frac{5}{8}$, ♀ $3\frac{1}{12}$ inches.

Male.—Upper side.—Anterior wings dark brown, shading into blackish towards the costa, and inclining to rufous-brown towards the base and margins; from the base a large fawn-coloured blotch spreads over the wing from above the median nearly to the sub-median nervure and above and between the two lower median nervules for half their length, the greater part of this outer portion being filled up with whitish. Below the lowest median nervule, and just before its middle, is an oval bluish-grey spot. A row of six violet-blue sub-marginal spots between the nervure to above the lowest median nervule, the middle ones smallest, the two nearest the costa marked with white.

Posterior wings dark brown, shading into rufous-brown

below the cell to the lower part of the hind and inner margins as far as the anal angle; apex dusted with white; a large buff costal patch spreading over the upper half of the cell, but not reaching its base or extremity.

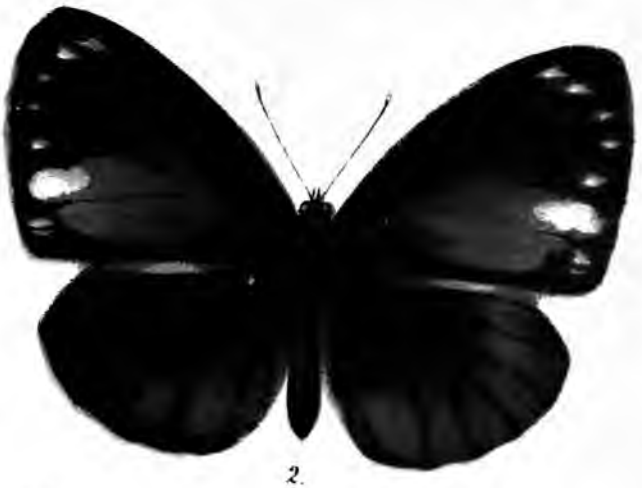
Under side.—Anterior wings brown; only the outer part of the fawn-coloured patch well marked; it is smaller and paler than above, and ends as a whitish blotch above the lowest median nervule. Below the median nervure, and for half the length below the lowest median nervule, the wing is pale buff, the place of the white spot above being marked by a narrow black oval outline; on the inner margin the wing is whiter on both sides of the sub-median nervure as far as the anal angle; sub-marginal spots smaller and whiter than above, the fifth obsolete.

Posterior wings uniform rufous-brown.

Body dark brown, inclining to blackish in front, with a white spot behind each antenna; four spots at the back of the head; a white spot on each side of the thorax in front, and diverging crests of grey hair on the front of the thorax above; sides of the head and thorax and base of the wings spotted with white beneath.

Female.—Upper side.—Anterior wings nearly as in the male, but the fawn-coloured patch much longer than in the latter, and not marked with white, except at the extremity, where the white suffusion forms a pear-shaped spot, covering the place of the sixth sub-marginal spot; the sub-marginal spots are larger and whiter than in the male, and are continued by a seventh, followed below by a short streak, above the sub-median nervure; the fawn-coloured patch nearly extends here to the seventh spot; the white oval spot of the male is, of course, wanting.

Posterior wings rufous-brown, darkest in the centre, dusted



2.

3.

1. Nebroda lobcugula.
2. Hirdapa rezia.
3. Tellervo misoriensis.

with grey along the costa, especially towards the tip, but with no buff space over the upper part of the cell.

Under side.—Anterior wings rufous-brown, the pale patch very large, fawn-coloured in and just below the cell, the rest mostly whitish as far as the inner margin, and along it nearly to the anal angle; of the sub-marginal spots, the two nearest the costa are represented as white dots, the sixth is large and connected by a neck with the outer part of the pale blotch, and there are two small white dots close together between the lowest median nervule and the sub-median nervure.

Head, body, and base of wings below spotted with white nearly as in the male, two white streaks at the back of the pectus being particularly conspicuous, much more so than in the male.

Hab.—Dinner Island, New Guinea. (*H. O. Forbes.*) In the collection of the British Museum.

Allied to *Hirdapa usipetes*, Hewitson (*Euplœa usipetes*, Ex. Butt., ii., *Eupl.*, pl. i., fig. 4), but may be distinguished at once by the sub-marginal spots. Hewitson's type of *E. usipetes* is from New Guinea, and appears to be the same species as a series from Aru in the British Museum. All these are males, and the insect which Hewitson describes as the female is evidently *Sarobia grayi* (Felder).

Since the above was written, the British Museum has received specimens from various countries apparently intermediate between *H. usipetes* and *H. rezia.*

Kirsch has figured a species of *Elymnias* (*E. thryallis*), from New Guinea, closely resembling *Hirdapa;* but it can be distinguished at once by its dentated wings, apart from any other characters.

GENUS TELLERVO.

Hamadryas, nec. Hübner, Boisduval, Voy. Astrolabe, Lép., p. 91 (1832); Doubl., Gen. Diurn. Lepid., p. 134 (1848); Moore, Proc. Zool. Soc. Lond., 1883, p. 253; Schatz, Exot. Schmett., ii., p. 91 (1886).

We have been obliged to rename Boisduval's genus *Hamadryas*, because that name had already been used by Hübner for our common Peacock-Butterfly (*Papilio Io*, Linn.); so we have named it *Tellervo*, which is the name of the daughter of *Tapio*, the Finnish god of the forests.

Some authors regard this genus as properly belonging to the *Danainæ*, while others prefer to consider it as an Old World representative of the otherwise exclusively Tropical American Sub-family *Ithomiinæ*.

The species of *Tellervo* are found in the Moluccas, New Guinea, Australia, &c. They are small black Butterflies, measuring less than two inches in expanse, with rounded wings and clear white markings. They are all very similar, and might easily be mistaken for species belonging to the genus *Neptis* in the *Nymphalinæ*. The type is

TELLERVO ZOILUS.

Papilio zoilus, Fabr., Syst. Ent., p. 480, no. 163 (1775).
Hamadryas zoilus, Boisd., Voy. Astrolabe, Lép., p. 91 (1832); Doubl. and Hew., Gen. Diurn. Lepid., pl. 18*, fig. 1 (1847).

A black Butterfly found in Australia, with three large white spots on the fore-wings, and the disc of the hind-wings white.

TELLERVO MISORIENSIS.

(*Plate VI., Fig.* 3.)

Hamadryas mysoriensis, Staudinger, Exot. Schmett., i., p. 54 (1885)

This species has not been figured before. It is found in Misori Island, N.W. New Guinea, and appears to be the same as *T. ovages* (Godman and Salvin), from the Solomon Islands. It differs from the other described species of the genus in having the white band on the hind-wings more or less broken into spots.

NOTE.—The genera *Lycorea* and *Ituna* of Doubleday, which are confined to Tropical America, and which were formerly placed in the *Heliconiidæ*, when this name was used as a family to include the *Heliconiinæ*, *Ithomiinæ*, &c., are now usually classed with the *Danainæ*. They are large long-winged insects, measuring about five inches across the wings. The species of *Lycorea* are black and tawny, with yellowish spots towards the apex of the fore-wings; those of *Ituna* are black, with marginal yellowish spots, or are sub-hyaline, with black bands and nervures. Some of them much resemble species of true *Heliconius*, &c.

SUB-FAMILY II. ITHOMIINÆ.

Egg.—Not yet described.

Larva.—Smooth or slightly warty, but without fleshy appendages, feeding chiefly on *Solanaceæ*.

Pupa.—Short, convex, sometimes nearly as broad as long, metallic.

Imago.— Usually of moderate size; wings long, slender, rounded, often thinly clothed with scales or entirely transparent, except on the borders and at the end of the cell; wing-cells closed. Sub-median nervure of fore-wings forked at the base. Antennæ long and slender; male without raised scales, but with a tuft of hairs below the sub-costal nervure of the hind wings (see Plate vii., fig. 3); female with the front tarsi long and slender. Abdomen with tufts of hair at the extremity in the male, and sometimes also in the female.

Range.—Entirely confined to Tropical America, if we exclude *Tellervo* from the Sub-family.

Habits.—These Butterflies are weak flyers, chiefly frequenting woods, and are abundant where they occur. Many of the species, however, have a very restricted range.

Characteristics.—The *Ithomiinæ* are a protected group, and are very closely mimicked by various *Pierinæ* belonging to the genus *Dismorphia*, and by certain Moths of the families *Castniidæ*, *Dioptidæ*, &c. The larger species, with opaque wings, belonging to the genera *Melanitis*, Fabricius, *Melnæa*, Hübner, &c., have frequently a close resemblance to tawny *Heliconiinæ*.

No species of this Sub-family has tailed, or even dentated, wings, and a great number are among the most transparent Butterflies known. They differ considerably in arrangement of markings and pattern; but their range of coloration hardly extends beyond various shades of black, white, tawny and yellow.

We have figured two representatives of the typical genus *Ithomia*, both with transparent wings, to illustrate this rather numerous group; but there is so much sameness throughout this Sub-family that we have not thought it necessary to deal with the principal genera in detail.

GENUS ITHOMIA.

Ithomia, Hübner, Verz. bek. Schmett., p. 9 (1816); Doubl., Gen. Diurn. Lepid., p. 26 (1847); Bates, Journ. Linn. Soc. Lond., xxiii., p. 537 (1862); Godman and Salvin, Biol. Centrali-Americana, Lepid. Rhop., i., p. 48 (1879).

As this is the typical genus of this Tropical American group, it is better to employ it as a family or sub-family name than to use Schatz's term, *Neotropidæ*. The species were formerly classed with the *Heliconiinæ*, and of late years with the *Danainæ*.

This typical genus of the *Ithomiinæ* probably comprises (with a few lately separated from it) about 200 species, and is the most extensive of the sub-family. A great number are more or less transparent, though some are opaque. The front legs of the males are reduced to a mere knob, the tarsi of the females are five-jointed, and the lower disco-cellular nervule of the hind-wings forms an acute or right angle with the median nervure, instead of an obtuse one.

The type is

ITHOMIA DOTO.

Nereis vitrea doto, Hübner, Samml. Exot. Schmett., i., pl. 1 (1806).
Ithomia doto, Hübn., *l.c.* text (1822 ?).

A yellowish-hyaline species, with narrower wings than *I. flora* (Cramer). It has narrow black borders, and black nervures; there is an orange-tawny stripe on the fore-wings below the narrow costal border, and another above the inner-marginal border ; and a sub-marginal orange-tawny band on the hind-wings, narrowly edged on both sides with black. It is a native of the Lower Amazons.

Dr. Scudder rightly, as we think, regards this species as the type of the genus, being the only one described by Hübner as an *Ithomia* in the fragmentary text to his "Sammlung." Other authors, however, select the following species, the first of four (of which *I. doto* is the third) included under *Ithomia* by Hübner in his "Verzeichniss."

ITHOMIA DRYMO.

Ithomia drymo, Hübner, Verz. bek. Schmett., p. 9, no. 3 (1816).
Papilio diaphana, Cramer (nec. Drury), Pap. Exot., iv., pl. 315 figs. D. E. (1780).

A Brazilian species, much resembling *I. flora* (Cramer), but

with no reddish tawny markings, and with a black mark towards the end of the cell on the hind-wings.

We add figures of two other species of *Ithomia*.

ITHOMIA DIAPHANA.

(*Plate VII.*, *Fig.* 1.)

Papilio diaphanus, Drury, Ill. Exot. Ent., ii., pl. 7, fig. 3 (1773).

This species, which inhabits Jamaica, belongs to an extremely transparent group with long narrow wings, which is sometimes regarded as generically distinct under the name of *Hymenitis* (Hübner). The tuft of hair on the wings is very conspicuous in Drury's figure, from which ours is copied.

ITHOMIA FLORA.

(*Plate VII.*, *Figs.* 2, 3)

Papilio flora, Cramer, Pap. Exot., iii., pl. 257, figs. B., C. (1779).

This insect is probably a variety of *I. astrea*, Cramer (Pap. Ex., i., pl. 22, fig. D., 1775), but as it is often represented in collections by specimens differing from that figured by Cramer under the name of *I. flora*, we have been careful to copy his figure exactly. Both *I. astrea* and *I. flora* are natives of Surinam.

SUB-FAMILY III. ACRÆINÆ.

Egg.—Resembling that of the *Danainæ*.

Larva.—Cylindrical, gregarious, with branching spines.

Pupa.—Long, slender, the thorax angulated, the abdomen sometimes with spines or filaments.

Imago.—Of moderate size, the antennæ strongly clubbed;

palpi long, divergent, rather thick, and scantily clothed with hair, except in *Actinote*. Wings rounded, rather long, never dentated or tailed; wing-cells closed, sub-median nervure of the fore-wings not forked at the base; median nervure simple; abdomen long, sometimes with a horny appendage in the female.

Range.—The *Acræinæ* are unknown in the Palæarctic and Nearctic Regions, but are very abundant in Africa, south of the Sahara, and in Madagascar. Two species only are found in the Indian Region, but several inhabit Australia, New Guinea, and some of the adjacent islands. One genus (*Actinote*) is peculiar to Tropical America, and is rather numerous in species.

Habits.—The *Acræinæ* are generally weak flyers, frequenting gardens and weedy places, and flying low; but some of the woodland species have a higher and stronger flight. In Africa they replace our smaller Fritillaries, to which many of the species have a general resemblance. They are gregarious insects, and often very abundant.

NOTE.—The *Acræinæ* are a protected group of Butterflies, though less so than the *Danainæ*, and are mimicked by various species of *Nymphalinæ* and *Papilioninæ*. It is even thought that the great West African *Drurya antimachus* (Drury), the largest of all African Butterflies, which often measures 8 or 9 inches across its long and narrow wings, has been modified in the direction of *Acræa*, if it is not an actual mimic of some gigantic extinct, or at present undiscovered, *Acræa*.

Most of the Old World species are red or tawny, spotted with black; a large number are more or less transparent, especially on the fore-wings; others are black, with white, yellow, or reddish transverse bands or spots; the American

species are more varied in their markings, though rarely spotted, and are never transparent.

The possession of a horny pouch in the females of many species is remarkable, for it is a character which attains its maximum of development in *Parnassius*, and other genera of *Papilioninæ*. The common Australian *Acræa andromache* (Fabricius) is mimicked by the female of *Eurycus cressida* (Fabricius), a species belonging to a genus allied to *Parnassius*, and which, curiously enough, likewise possesses a pouch.

The genus *Acræa* was divided by Doubleday into six sections, which later entomologists have treated as genera or sections according to their various views; and one or two other genera have been proposed since. But the genus *Alæna* proposed by Boisduval for a small South African species, has lately been removed from the *Acræinæ*, as it proves to belong to the *Lycænidæ*.

GENUS ACRÆA.

Acræa, Fabr. in Illiger, Magazin für Insektenkunde, vi., p. 284 (1807); Latr., Enc. Méth., ix., pp. 10, 227 (1819); Doubl., Gen. Diurn. Lep., p. 140 (1848); Trimen, Rhop. Afr. Austr., p. 92 (1862); id., S. Afr. Butt., i., p. 131 (1887); Schatz, Exot. Schmett., ii., p. 101 (1887).

Type, *Acræa horta* (Linn.), from South and West Africa.

ACRÆA HORTA.

Papilio horta, Linn., Mus. Ludov. Ulr., p. 234 (1764); Drury, Ill. Ex. Ent., iii., pl. 28, figs. 1, 2 (1782); Cram., Pap. Exot., iv., pl. 298, figs. F. G. (1780).

Acræa horta, Godart, Enc. Méth., ix., p. 231 (1819); Trimen, Rhop. Afr. Austr., i., p. 92 (1862); id., S. Afr. Butterflies, i., p. 134 (1887); Staud. Exot. Schmett., i., p. 82, pl. 33 (1885).

This is a brick-red insect, with the outer portion of the

fore-wings transparent; there is a black bar closing the cell on the fore-wings, and sometimes one or two small adjacent spots; the hind-wings are spotted with black at the base and in the cell, and have an irregular row of spots beyond and below the cell; the hind-margin is black, with a row of red spots, hardly separated from the red part of the wing on the inner side. The female is more transparent, and the reddish colour is replaced by ochreous. It expands from 2 to 2¾ inches. The larva feeds on passion-flowers in gardens as well as on native African trees. It is a very common Butterfly in South Africa, and birds will not eat its spiny, strongly-smelling larvæ. (*Trimen.*)

The typical section of *Acræa* includes most of the species with more or less transparent wings. Doubleday called it *Hyalites*, in allusion to this feature; and therefore Dr. Scudder is wrong in proposing to restrict the latter name to *A. encedon* (Linn.), an opaque species, which Doubleday considered to form a separate sub-section. If, however, any hyaline species included by Doubleday under *Hyalites* should be considered generically distinct from *A. horta*, then the name *Hyalites* must be revived for it; but not otherwise. Mr. Trimen unites the following sections under *Acræa: Hyalites*, Doubl., *Gnesia*, Doubl., *Telchinia*, Hübn., and *Pareba*, Doubl. In this he may be correct, except in respect to *Pareba*, which has much longer and narrower wing-cells than the other groups, with the disco-cellular nervules straight and oblique. The typical species of *Pareba* is *P. vesta* (Fabr.), a light ochreous insect, often intersected with light brown stripes. It is about 2½ inches across the wings, and is common in many parts of the Indian Region. Most of the species belonging to the other sections named are African. *Telchinia violæ* (Fabr.), a common East Indian species of this Sub-family, is smaller than *P. vesta*, and is of a warm fulvous colour, with black borders, spotted on the

hind-wings with fulvous. There are several black spots on the fore-wings, of which the largest are near the costa. It is very similar to many African species of the genus or sub-genus *Telchinia*.

As an illustration of typical *Acræa*, we have figured a newly-described species from the Louisiade Archipelago, near New Guinea.

ACRÆA ŒNONE.

(*Plate XXXVII., Fig.* 3.)

Acræa œnone, Kirby, Ann. and Mag. Nat. Hist., ser. 6, vol. 4, p. 163 (1889).

Expanse, about an inch and three-quarters.

Male and Female.—Fore-wings semi-transparent grey, darker along the margins and especially at the tip, with a black spot at the base of the cell and transverse black spots in its middle and at its extremity. Beyond the cell is a row of three smaller more or less confluent spots, and there are two more between the branches of the median nervure near their origin; there are also two larger spots between the median and sub-median nervures, one near the base and the other above the middle of the inner margin, and a row of indistinct sagittate spots between the nervures on the hind-margin. Hind-wings black, with a sub-marginal series of eight oblong buff spots, divided by the nervures, those nearest the anal angle emarginate on the inside. The spot nearest the costa is linear and considerably produced inwards; below its inner edge descends a row of three smaller spots, divided by the nervures, and within this is another large irregular spot; in the black border is a row of obsolete tawny spots, more distinct as they approach the anal angle.

Under side similar, but on the hind-wings the sub-marginal tawny spots are much more distinct, and there are several cream-coloured spots in the dark basal portion of the wings, which are only indistinctly indicated on the upper surface.

Body black; the palpi, two round spots on the pro-thorax above, a double row of spots on the sides of the abdomen, and transverse stripes beneath, buff. Pouch of the female reddish.

Allied to the Australian *A. andromache*, Fabr.; but the latter species is larger, and the buff colour extends over the whole hind-wing except at the extreme base and hind-margin, being divided in the middle by a single or Y-shaped row of confluent black spots.

The typical specimens are in the British Museum. They were collected by Mr. Basil Thomson.

GENUS GNESIA.

Acræa, section iii., *Gnesia*, Doubl., Gen. Diurn. Lep., p. 141 (1848).

In this genus or sub genus the palpi are less swollen and more scaly than in typical *Acræa*, and the fore-wings are longer and narrower, rarely transparent, and the cell of the hind-wings is much shorter. The species are generally rather large, brown and red, insects, with black spots and borders; but Dr. Scudder has selected *G. circeis* (Drury) from Sierra Leone as the type. It has more resemblance to typical *Acræa* than the group of *G. zetes*, and the latter group will, perhaps, be ultimately separated from *Gnesia*.

GNESIA CIRCEIS.

Papilio circeis, Drury, Ill. Ex. Ent., iii., pl. 18, figs. 5, 6 (1782).

A comparatively small species from Sierra Leone, measuring two inches in expanse. The fore-wings are rather long, and are transparent, with the borders and nervures rather broadly brown; the hind-wings are brown, with black spots at the base, and a yellow band across the centre; the body is spotted with white.

The larger species of *Gnesia* measure from three to four inches in expanse. *G. zetes* (Linn.) is dark brown, spotted with black, with a wide red band on the hind-wings, and some yellow spots on the fore-wings. *G. egina* (Cramer) is also dark brown, spotted with black, with a broad red band on the hind-wings, which is continued on the lower part of the fore-wings; the females are grey or tawny, instead of red. They are natives of Africa, and are mimicked by *Papilio ridleyanus*, White, *Pseudacræa trimeni*, Butler, and *P. boisduvalii* (Doubled.).

GNESIA MEDEA.

(*Plate VII., Fig.* 4.)

Papilio medea, Cram., Pap. Exot., i., pl. 81, figs. C. D. (1775).

Papilio medoa, Beauv., Ins. Afr. Amér., p. 220, pl. vi., figs. 2, 2a, 2b (1805).

Papilio pasiphäe, Fabr., Spec. Ins., ii., p. 33, no. 140 (1781).

Acræa pasiphäe, Godart, Encycl. Méth., ix., p. 235, no. 18 (1819).

A grey insect, with black borders and spots, and white markings. It is a native of Guinea, and is not represented in the collection of the British Museum, but Dr. A. G. Butler regards it as a variety of the female of *G. egina* (Cram.).

GENUS ACTINOTE.

Actinote, Hübn., Verz. bek. Schmett., p. 27 (1816); Godem. & Salv., Biol. Centr. Amer., Lep. Rhop., i., p. 140 (1881).

Acræa, section *Actinote*, Doubl., Gen. Diurn. Lep., p. 142 (1848).

This name is now generally employed for the American species of *Acræinæ*. The palpi are only slightly inflated, but

1. Ithomia diaphana.
2.3. do. flora.
4. Gnesia medea.

densely clothed with hair and scales, and the front legs in the males are very small. The wing-cells are no narrower than in typical *Acræa;* but those of the fore-wings are much shorter than in *Planema*, and the disco-cellular nervules run much more irregularly. They are small Butterflies, generally expanding about 1½ or 2 inches; and they do not reach the Nearctic Region.

They vary very much in pattern from the African species of the Sub-family, but have generally either black fore-wings, banded and spotted with tawny or yellowish, and tawny or yellowish hind-wings, bordered with black; or else they are black, with red or yellowish markings.

The type is

ACTINOTE THALIA.

Papilio thalia, Linn., Syst. Nat. (ed. x.) i., p. 467, no. 63 (1758); id., Mus. Ludov. Ulr., p. 230 (1764); Clerck Icones, pl. 43, fig. 2 (1764); Cramer, Pap. Exot., iii., pl 246, fig. A. (1781); Stoll. Suppl. Cram.., v., pl. i., figs. 6a, 6b (1787).

Acræa thalia, Godart, Enc. Méth., ix., p. 240, no. 33 (1819).

This insect, which measures rather more than two inches in expanse, is common throughout Tropical America. The fore-wings are rather long, brown in colour, with yellowish basal streaks and an oblique row of long spots, separated by the nervures, towards the apex. The hind-wings are rust-coloured, with brown veins, intermediate streaks, and borders. In the female the pale portions of the wings are grey or whitish.

"Stoll represents the larva of *Acræa thalia* as thickly covered with blackish spines fringed with brown hairs. It is brown, with a black dorsal stripe, and is said to feed on the shrubby cotton. The pupa is represented as stouter than that of

HELICONIUS MELPOMENE.

Papilio melpomene, Linn., Syst. Nat. (ed. x.), p. 467, no. 55 (1758); id., Mus. Ludov. Ulr., p. 232 (1764); Cramer, Pap. Exot., ii., pl. 191, fig. C. (1777).

Heliconia melpomene, Godart, Encycl. Méth., ix., p. 208, no. 15 (1819).

Heliconius melpomene, Bates, Trans. Linn. Soc. Lond., xxiii., p. 557, no. 12 (1862); Godman and Salvin, Biol. Centrali-Amer., Lepid. Rhop., i., p. 154 (1881); Staud., Exot. Schmett., i., p. 78, pl. 32 (1885).

A black Butterfly, with a broad red bar across the fore-wings. It is common in South and Central America as far north as Nicaragua; and there are a number of closely-allied species.

Heliconius is a rather large genus of handsome Butterflies, which may easily be known by the characters of the Sub-family given above, and by their comparatively large size, and long slender antennæ. The species of *Eueides*, Hübn., the only other genus, are much smaller, and have shorter antennæ, more distinctly clubbed.

These Butterflies are always black or blue-black, with yellow, white, red, and tawny markings. Some are very simply coloured, as, for instance, *H. melpomene* (Linn.), and its allies, which are black, with a broad red band or blotch on the fore-wings. In other species there may be a white or yellow band, or even two or three on the fore-wings, perhaps with red or yellow markings at the base, at least underneath; and the hind-wings may be banded with white, red, or yellow, or radiated with red, blue, or green. We have figured two species, *H. erato* (Linn.; pl. viii., fig. 1), and *H. vesta* (Cram.; pl. viii., fig. 2), which exhibit these radiated markings. There is an in-

sect which is considered to be a dimorphic form of *H. erato*, as it usually occurs with it, and appears to be actually the same species, called *H. doris* (Linn.), in which the red markings are replaced by blue or green.

Many of these species are very abundant, and have a very wide range throughout Tropical America.

We have figured a third species of the genus, *H. sylvanus*, (Cram.; pl. viii., fig. 3), which may serve to represent the black, tawny, and yellow species. They are more restricted in their range, *H. sylvanus* being a native of Surinam. These tawny species are often so closely mimicked by *Ithomiinæ* of the genera *Mechanitis*, Fabr., and *Melinæa*, Hübn., as to be almost undistinguishable in a cursory examination.

SUB-FAMILY V. NYMPHALINÆ.

Egg.—Very variable in form.

Larva.—Spiny, or with fleshy prominences; feeds on low plants, or shrubs.

Pupa.—Generally more or less angular, rather long.

Imago.—Generally of moderate size, rarely small; antennæ usually with a distinct club; wings ample, sometimes angulated, or with a short tail; the cells, at least of the hind-wings, open, or closed by a rudimentary nervure; sub-median nervure of fore-wings generally forked at the base; inner margin of hind-wings more or less concave.

The *Nymphalinæ* are a very large group of Butterflies, including, with the *Apaturinæ*, a quarter of the whole of the *Nymphalidæ*, and divided into about 150 genera. Some authors include the *Morphinæ* with them, but these are now usually treated as a distinct Sub-family. The *Nymphalinæ* and *Apaturinæ* may easily be distinguished from every other

Sub-family, except the *Morphinæ*, by the rudimentary front legs, and more or less completely open wing-cells. The smaller species flutter from flower to flower, but the larger species are strong on the wing, and have a robust and sustained, and, in some cases, a very lofty flight. They have a habit, however, of returning constantly to a favourite spot, or of settling on the ground in muddy places to drink, or else on trees to suck the exuding sap. They are also fond of settling on dung, carrion, or other strongly-smelling substances.

The *Nymphalinæ* and *Apaturinæ* may be divided into a number of fairly distinct groups, four of which are represented in Britain by the Fritillaries, the Vanessas, the White Admiral, and the Purple Emperor; in short, by all our largest and most conspicuous species, except those of a white or yellow colour. It will be best to treat of the various groups of these extensive Sub-families separately, under the different representative genera which we have selected for illustration.

Most recent authors do not recognise the two Sub-families; but the larvæ of *Charaxes* and *Apatura* differ so much from those of the earlier genera, that I have finally decided to treat them as a distinct Sub-family, as was done by Boisduval and others. It is only right to say that this course was strongly urged upon me by the late Mr. Jenner Weir, whose recent death is regretted by so many as the loss of a friend, as well as of a good naturalist. Though he was a wonderfully well-informed man, he wrote little himself, and usually left it to others to publish his observations.

Schatz and Röber, in their great work on the genera of Butterflies, divide the *Nymphalinæ* (including with them the *Apaturinæ*) into twelve groups of somewhat unequal importance. They have also made several trenchant alterations in the position of many of the genera; and their arrangement will, in the main, be followed here. It is as follows:—

Groups of Genera of Nymphalinæ as arranged by Schatz.

A. Larva clothed with more or less developed spines.

a. Front tarsi in the female with spines on joints 1–4.

† *Median spur present.*

I. Argynnis group:
Colænis, Dione, Cethosia, Cynthia, Argynnis.

‡ *Median spur absent.*

II. Melitæa group:
Melitæa, Phyciodes, Coatlantora.

III. Vanessa group:
Hypanartia, Vanessa, Precis, Salamis, Kallima, Eurytela.

IV. Diadema group:
Hypolimnas, Victorina, Hestina, Euripus, Euxanthe.

V. Ageronia group:
Ageronia, Panacea, Ectima;
and sub-section: Biblis group, Didonis, Cystineura, Vila.

b. Front tarsi in the female with spines on joints 2–4 only.

† *Median spur absent.*

VI. Eunica group.

a. Eunica group (restricted).
Myscelia, Catonephele, Eunica, Temenis.

b. Catagramma group:
Perisama, Callicore, Catagramma, Callithea:
and sub-section: Gynæcia group: Gynæcia, Smyrna, Callizona.

VII. Neptis group:
Neptis (and Dynamine ?).

†† *Median spur present.*

VIII. Limenitis group:

Limenitis, Adelpha, Athyma, Pseudacræa, Parthenos, Euryphene, Romaleosoma [Euphædra], and allies (with Megalura and Cyrestis?).

IX. Euthalia group:

Euthalia, Symphædra.

B. Larva smooth, only the head provided with horns or short prickles; tail forked.

† *Median spur absent.*

X. Apatura group:

Apatura and allies, Thaleropis, Dichorragia, Apaturina.

XI. Anæa group:

Anæa, Hypna, Protogonius.

Sub-section: Group of Pseudo-Nymphalinæ, Aganisthos, Coea, Megistanis.

†† *Median spur present.*

XII. Nymphalis group.

Siderone, Prepona, Charaxes, Prothoe.

This arrangement is, however, tentative and artificial, and will require considerable modification and improvement before it can be accepted as final. Thus, while the long-winged *Colænis* and *Metamorpha* seem quite out of place in the "Argynnis" group, *Argynnis* and *Melitæa*, and *Neptis* and *Limenitis*, appear to be too closely allied to be worth separating as distinct sections. What Schatz calls the "median spur" is a short spur-like branch from the base of the median nervure of the fore-wings, *not* a spine, nor a frenulum.

GENUS METAMORPHA.

Metamorpha, Hübner, Verz. bek. Schmett., p. 43 (1816); Godman & Salvin, Biol. Centrali-Amer., Lepid. Rhop., i., p. 166 (1881); Schatz, Exot. Schmett., ii., p. 113 (1887).

Metamorpha dido.

Metamorpha dido.

The type is

METAMORPHA DIDO.

(*Plate IX.*)

Papilio dido, Johanssen, Amœn. Acad. vi., p. 408, no. 74 (1764), Linn., Syst. Nat. (ed. xii.), i. (2), p. 782, no. 192 (1767); Clerck, Icones, pl. 30, fig 2 (1764); Cram. Pap. Exot., iii., pl. 196, figs. E. F. (1779).

Cethosia dido, Godart, Enc. Méth., ix., p. 246, no. 9 (1819).

Metamorpha dido, Godman & Salvin, Biol. Centrali-Amer., Lep. Rhop., i., p. 166 (1881).

Colænis dido, Staud., Exot. Schmett., i., p. 86, pl. 34 (1885.)

Metamorpha dido resembles a *Heliconius* in its very long fore-wings, which are slightly dentated; the hind-wings are much more so. It expands about four inches, and is a very common Tropical American insect, frequenting cultivated ground. It is velvety-black above, with green markings. The fore-wings have a green band in the cell, beyond which is a broad green band interrupted about the middle of the wing, but continued by oblique bands below the lower end of the extremity of the cell; and there are also several other green spots. The hind-wings are green at the base, and are marked with a row of rather large sub-marginal spots. The under surface is green and black, varied with reddish ochreous and silvery-white. The larva has several rows of short spines, radiating from tubercles, and two very long caudal appendages. It is green, with a red and white stripe on each side, and feeds on *Passifloræ*.

The allied Tropical American genera *Colænis* and *Dione*, Hübner, likewise much resemble the *Heliconiinæ* in their habits, long wings and larvæ; and Fritz Müller proposed to include them in the same group, notwithstanding their open wing-cells. The species of *Colænis* and *Dione* are mostly fulvous Butterflies, bordered and varied with brown or blackish; but one or two are reddish. The species of *Colænis* are of nearly the same shape as

Metamorpha, which most entomologists have, until lately, included in the same genus; but those of *Dione* have shorter fore-wings, with the hind-margin more excavated, and sub-triangular hind-wings. In *Colænis* the under surface generally resembles the upper, but is paler; while in *Dione* the hind-wings beneath and the apical half of the fore-wings are still more richly spotted with bright silver than in our Queen of Spain Fritillary.

Respecting the habits of *Colænis* and *Dione*, Bates writes that "they are seen only in open sunny places, such as waste grounds, gardens, and the borders of woods, where flowering bushes grow. They are never found in the great forest, but seem to be attendants on man, making their appearance wherever a clearing is commenced in the woods. They have not a very rapid flight, nor much of the floating mode of progression when on the wing, but move about somewhat irregularly, and settle frequently, their attraction being always flowers, and never moisture, or filth on the ground, as is the case with the more typical genera of *Nymphalidæ*." He also remarks on their close relationship with the *Heliconiinæ*.

GENUS CETHOSIA.

Cethosia, Fabr. in Illiger, Mag. Insekt., vi., p. 280 (1807); Latr. and Godart, Encycl. Méth., ix., p. 242 (1819); Doubl., Gen. Diurn. Lepid., p. 150 (1848); Moore, Lepid. Ceylon, i., p. 81 (1880); Distant, Rhop. Malay., p. 170 (1883); De Nicév., Butterflies Ind., ii., p. 31 (1886); Schatz, Exot. Schmett., ii., p. 115 (1887).

The types are *Cethosia biblis* (= *P. penthesilea*, Fabr., nec. Cram.), from North India; and *C. cydippe* (Linn.), from the Moluccas.

The genus *Cethosia* is characteristic of the Indo- and Austro-Malayan Regions, to which it is exclusively confined, and where

it seems to represent *Argynnis*, two species only of which range beyond Northern India over the countries occupied by *Cethosia*. The *Cethosiæ* are very handsome Butterflies, measuring about three inches in expanse, with broad dentated wings, and generally with elegant festooned markings, at least on the under surface, giving them very much the same character of coloration as a Turkey carpet, patterns for which might easily be taken from these Butterflies. The upper surface is generally tawny or fulvous, often spotted with black; the borders, and the apical portion of the fore-wings are more or less broadly black or brown, with a white band, or whitish markings. The tawny colouring is sometimes replaced by white or bluish-white, especially in the females, and one species, *C. leschenaultii* (Godart) from Timor, much resembles our Camberwell Beauty, being of a reddish-brown colour above, with a broad pale yellow border, divided by the nervures.

The larvæ are spiny, black, banded with red and yellow, and with two protuberances on the head. Like the larvæ of *Metamorpha* and its allies, they are stated to feed on *Passifloræ*, and are even said to possess stinging properties, no doubt resident in the spines, though the larvæ of Butterflies do not possess the terribly urticating arrangements (described, in some cases, as amounting to fascicles of actual stings) which render the caterpillars of some Moths so formidable.

As a representative of this genus we have figured

CETHOSIA MAHRATTA.

(*Plate X.*)

Cethosia mahratta, Moore, Proc. Zool. Soc. Lond., 1872, p. 556; De Nicév., Butterflies Ind., ii., p. 34, pl. 22, fig. 98 (1886).

Papilio cyane, Cramer (nec. Drury), Pap. Exot., iv., pl. 295, figs. C., D. (1780)

This is a very handsome South Indian species, measuring nearly four inches across the wings. It has fulvous fore-wings, bordered behind with yellowish-tawny, which colour extends over the greater part of the hind-wings. The hind-margins are black, with the fringes white, and a festooned white line within. The apical portion of the fore-wings is black, and both wings are crossed by a row of large oval black spots, mostly with white borders; besides which there is an oblique white band, cut by the nervures, running from the costa towards the middle of the border of the fore-wings. The fulvous portion of the latter is marked with two rows of spots, diverging hindwards, and continued more regularly on the hind-wings; nearer the base are a few more black spots. On the under surface the black portion of the wing is reduced, the white markings are rather more extended, and the rows of black spots are more regular.

Until recently this species was confounded with *C. cyane* (Drury), a commoner and more uniformly tawny Indian species.

GENUS CYNTHIA.

Cynthia, Fabr., Illiger, Mag. Insekt., vi., p. 281 (1807); Doubl., Gen. Diurn. Lep., p. 212 (1849); Moore, Lepid. Ceylon, i., p. 52 (1880); Distant, Rhop. Malay., p. 183 (1883); De Nicév., Butterflies Ind., ii., p. 40 (1886); Schatz, Exot. Schmett., ii., p. 116 (1887).

The type is

CYNTHIA ARSINOE.

Papilio arsinoe, Cramer, Pap. Exot., ii., pl. 160, f. B. C. (1777).

It is said by Cramer to be found in the islands of Amboina and Sumatra.

This genus was formerly included with *Vanessa*, on account of the shape of the wings, which have the hind-margins scalloped, those of the fore-wings slightly concave, and those

Cethosia mahratta.

of the hind-wings angulated below, and with a strong projecting tooth at the outer angle. Now, however, they are considered to be nearly allied to *Argynnis*, but their shape, combined with the two large eyes on the hind-wings, will be amply sufficient to distinguish them from any other genus of this group. They are large insects, four or five inches in expanse, and are peculiar to India and the Indian and Austro-Malayan islands as far as New Guinea. The sexes are very dissimilar, the males being orange-tawny or fulvous, and the females brown, with blue and white markings. They still require careful study in order to determine the number and range of the species, and to assign the sexes correctly. As in many other Butterflies, the females are much larger than the males.

CYNTHIA JULIANA.

(*Plate XIX., Fig.* 1.)

Papilio juliana, Cramer, Pap. Exot., iii., pl. 280, figs. A. B. (1780).

This fine Butterfly is a native of the Island of Amboina, and measures nearly five inches across the wings. It is generally regarded as the female of *C. arsinoe* (Cramer), a fulvous Butterfly, with two large eyes on the hind-wings; but as this is uncertain, it is better to employ the name given by Cramer to the present insect, though there is little doubt that the true male will ultimately prove to much resemble *C. arsinoe*.

In *C. juliana* the wings are brown above, and the fore-wings are bordered with pale blue, followed by two black lines, one marginal, and the other sub-marginal. Within these are three irregular rows of white spots and crescents, generally bordered with black. In the cell are two blackish transverse streaks. The hind-wings are marked with a very broad sub-margi bluish band, with an irregular border on the inner side, are bordered on the outside with large black and bluish-w

lunules. On the band appear two very large black eyes with blue pupils in yellow and black rings. The under side is much paler than the upper, and the white spots of the fore-wings are united into an almost continuous band, as on the hind-wings.

THE LARGE SILVER-MARKED FRITILLARIES. GENUS ARGYNNIS.

Argynnis, Fabr., Illiger, Mag. Insekt., vi., p. 283 (1807); Latr., Encycl. Méth., ix., p. 10 (1819); Doubl., Gen. Diurn. Lepid., p. 171 (1848); Schatz, Exot. Schmett., ii., p. 118 (1887).

Various authors have selected *A. aglaia* and *A. paphia* as types of this genus, but the former seems to have the better claim. At present, however, these species are usually regarded as congeneric, so that the point is of no immediate consequence.

This genus includes the larger silver-spotted and silver-streaked Fritillaries, and our British species may easily be distinguished by their comparatively large size (they usually measure from two to three inches across the wings), their fulvous hue above, spotted with black, and the conspicuous silver streaks or spots of the under surface. The antennæ have a short broad club, the fore-wings are more or less pointed, with the hind-margin slightly oblique, and sometimes a little pointed, while the hind-wings are rounded and dentated. The palpi are prominent, and much thickened, though the terminal joint is small and pointed; two sub-costal nervules are thrown off before the end of the cell on the fore-wings, and there is a short median spur.

The larvæ are covered with branching spines, and generally feed on violets.

The genus *Argynnis* is peculiar to the Northern Hemisphere, and is almost confined to the temperate regions. It is only

found in Africa along the north coast, which really belongs to the European fauna; and though several very handsome species are found in Northern India, the only species properly belonging to the Indian Peninsular fauna is *A. niphe* (Linn.), a somewhat aberrant form, the female of which mimics *Limnas chrysippus*. It is found in India, Ceylon, and Sumatra; and an allied species, in which, however, the female resembles the male, *A. inconstans*, Butler, is found in Australia. Several species exhibit a tendency to dark green instead of fulvous colouring, especially in the female, as in the dark variety of our own *A. paphia* (Linn.), and in both sexes of the South European *A. maia* (Cramer). Another remarkable species with a green female is *A. sagana*, Doubleday, a Butterfly found in China and Japan, in which the male is very similar to *A. paphia*, but the female is dark green, with large white blotches and spots, giving it much the appearance of the genus *Athyma*, which is allied to *Limenitis*. It is not surprising that when this female was first brought from Eastern Siberia it should have been described as belonging to a new genus and species, under the name of *Damora paulina*, Nordmann.

Among the Himalayan species is the splendid *A. childreni*, Gray, a very large insect measuring four inches or more in expanse, and marked with broad silver interlacing bands on the under surface.

Argynnis is one of the few genera which are as well represented in the Nearctic as in the Palæarctic Region. Many very handsome species are common in most parts of the United States, such as *A. idalia* (Drury), which measures nearly four inches across the wings. The fore-wings are fulvous, spotted with black, and the hind-wings are brown above, with a transverse row of white spots, and a sub-marginal row, orange in the male, and white in the female; beneath there are four rows of slightly silvery spots. But the greatest variety is found in the

1. 2. Argynnis paphia.
3. 4. Melitæa cinxia.

South-western United States. One of the most remarkable species of the Southern States is *A. diana* (Cramer), the male of which is black, with a very broad orange border, while the female, which measures five inches in expanse, is dark green, with several rows of white spots towards the margins of the fore-wings, and with broad blue bands towards the margins of the hind-wings.

THE SILVER-WASHED FRITILLARY. ARGYNNIS PAPHIA.

(*Plate XI., Figs.* 1, 2; *Male.*)

Papilio paphia, Linn., Syst., Nat. (ed. x.), i., p. 481, no. 138 (1758); id., Faun. Suec. (ed. ii.), p. 281, no. 1064 (1761); Esper, Schmett., i. (1), p. 223, pl. 17, figs. 1, 2; i. (2), p. 58, pl. 60, fig. 4 (1777).

Argynnis paphia, Steph., Ill. Brit. Ent. Haust., i., p. 40 (1827); Kirby, Eur. Butterflies and Moths, p. 21, pl. 9, figs. 6a–d (1878); Lang, Butterflies Eur., p. 214, pl. 3, fig. 1 (1883); Buckler, Larvæ of Brit. Butterflies and Moths, i., p. 58, pl. 10, fig. 1 (1886); Barrett, Lepid. Brit. Isl., i., p. 156, pl. 22 (1892).

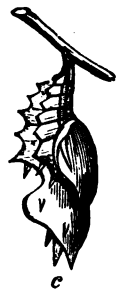
Var. α. *Argynnis valesina.*

Papilio valesina, Esper, *l.c.*, i. (2), p. 73, pl. 107, figs. 1, 2 (1790?).

Argynnis paphia, var. *valezina*, Lang., *l.c.*, p. 214, pl. 52, fig. 2 (1883).

This is one of the largest and handsomest of our British Butterflies, sometimes measuring nearly three inches in expanse. The male is of a rich fulvous, with two rows of black spots on the outer half of the wings, in addition to a marginal row. There are also several black spots towards the centre of the fore-wings, and a thick black interrupted zig-zag line across all the wings; and the fore-wings are streaked with black along

the longitudinal nervures. The female is very similar, but is of a more yellowish fulvous; and in the variety *A. valesina* (Esper) it is greenish-brown, with black spots, and some white spots near the tip of the fore-wings. There are no black streaks on the nervures in the female. On the under surface, the fore-wings are marked nearly as above, but the tip is greenish. The hind-wings are green, with a silvery streak across the centre, and two shorter ones nearer the base; the hind-margin



Suspended Chrysalid of *Argynnis paphia.*

has a more or less distinct silvery streak. It is found in woods in July and August.

The larva is light brown, yellowish on the back, with two dark lines along the sides; the spines are long and hairy, and two, placed on the first segment just behind the head, are considerably longer than the rest. (See plate iii., fig. 5.) It feeds on dog-violet and raspberry in May and June.

This fine Butterfly is very common in woods in many parts of England, frequenting the open glades and edges, where sometimes several may be seen together, chasing each other, or settling on brambles and other flowers. It is a powerful insect on the wing, and by no means easy to catch, if frightened; and when it is settled on a bramble-flower, it is of course diffi-

1. 2. Argynnis aglaia.
3. 4. Brenthis euphrosyne.

1. 2. *Argynnis aglaia*
3. 4. *Brenthis euphrosyne*

cult to try to capture it without the risk of tearing or entangling the net.

THE DARK GREEN FRITILLARY. ARGYNNIS AGLAIA.

(*Plate XII., Figs.* 1, 2.)

Papilio aglaia, Linn., Syst. Nat. (ed. x.), i., p. 481, no. 140 (1758); id., Faun. Suec. (ed. ii.), p. 281 (1761); Esper, Schmett., i. (1), p. 229, pl. 17, fig. 3; i. (2), p. 57, pl. 60, fig. 2 (1777).

Argynnis aglaia, Steph., Ill. Brit. Ent. Haust., i., p. 39 (1827); Curtis, Brit. Ent., vii., pl. 290 (1830); Kirby, Eur. Butterflies and Moths, p. 21, pl. 9, figs. 4a–d (1878); Lang, Butterflies Eur., p. 209, pl. 50, fig. 1 (1883); Buckler, Larvæ Brit. Butterflies and Moths, i., p. 71, pl. 10, fig. 3 (1886); Barrett, Lepid. Brit. Isl., i., p. 167, pl. 24 (1892).

Var. *Papilio charlotta*, Haworth, Lepid. Brit., i., p. 32, no. 37 (1803); Sowerby, Brit. Miscell., i., pl. 11 (1806).

The Dark Green Fritillary is the commonest and most widely-distributed of our larger Fritillaries, and is found in meadows and on heaths, frequently settling on flowers, though capable of a strong and sustained flight. It is met with in June and July.

It generally measures from 2¼ to 2½ inches across the wings, which are fulvous on the upper surface, and darker, with a slight greenish shade, in the female. The base is more or less black, and the hind-margins are black, with a festooned black line running round them, enclosing fulvous spots. Within this is a transverse series of larger round spots; and nearer the base are more black spots and short streaks in the cell and between the nervures. The fore-wings are fulvous beneath, with the tip and hind-margin greenish, more or less spotted with silver. The hind-wings are greenish, with a band of silvery

spots across the centre, a row of silvery spots on the hind-margin, and several more towards the base.

The larva feeds on dog-violet in May and June. It is brownish-black, yellowish on the back, with a row of quadrate lateral red spots, one on each side of each segment, except

Under side of the variety of the Female called *A. charlotta.*

the two near the base. The pupa is reddish, with waved streaks of brown.

This species is not only one of the commonest, but one of the most widely-distributed throughout Europe and Asia; and some of the Himalayan, and even Californian, forms resemble it so closely that many entomologists have regarded them as identical.

The variety called *A. charlotta* has very large silvery spots towards the base; it is purely accidental, and not common.

THE HIGH BROWN FRITILLARY. ARGYNNIS ADIPPE.

(*Plate XIII., Figs.* 1, 2.)

Papilio adippe, Linn., Syst. Nat. (ed. xii.), i. (2), p. 786, no. 212 (1767); Esper, Schmett., i. (1), p. 232, pl. 18, fig. 1., p. 369, pl. 43, fig. 2; i. (2), p. 58, pl. 60, fig. 3, p. 120, pls. 74, 75, figs. 1, 2 (1777).

High Brown Fritillary (*Argynnis adippe*). Upper side of the Male.

Upper side of the Female.

Under side of the Male.

Argynnis adippe, Steph., Ill. Brit. Ent. Haust., i., p. 38 (1827); Kirby, Eur. Butterflies and Moths, p. 20, pl. 9, fig. 3 (1878); Lang, Butterflies Eur., p. 212, pl. 50, fig. 1 (1883); Buckler, Larvæ Brit. Butterflies and Moths, i., p. 65, pl. 10, fig. 2 (1886); Barrett, Lepid. Brit. Isl., i., p. 161, pl. 23 (1892).

Var. a. Argynnis cleodoxa.

Argynnis cleodoxa, Ochsenh., Schmett. Eur., iv., p. 118 (1816); Lang, *l.c.*, pl. 51, fig. 2 (1883).

Papilio adippe, Esper, Schmett., i. (1), p. 317, pl. 26, fig. 4; i. (2) p. 120, pl. 74, fig. 3, p. 127, pl. 76, fig. 2b (1777).

Var. b. Argynnis chlorodippe.

Argynnis chlorodippe, Herr.-Schäff., Schmett. Eur., vi., p. 5 (1852).

Argynnis adippe, var. *chlorodippe*, Lang, *t.c.*, pl. 51, fig. 3 (1883).

This species is generally rather smaller than *A. aglaia*, measuring two inches or a little more across the wings, and although not uncommon in many localities, is much less generally abundant than *A. aglaia*. It is more of a woodland insect, though it also frequents heaths, appearing like the other large Fritillaries, about July.

The upper surface of the wings is very similar to that of *A. aglaia*, and the transverse row of black spots consists of five on the fore-wings (there being a break between the second and third) and three on the hind-wings. In the male, two of the nervures of the fore-wings are thickened. On the under surface, the tip of the fore-wings is yellowish, not spotted with silver, or with only two or three spots, and the hind-wings are also yellowish, with silvery spots, which are rather dull towards the hind margins. A row of red spots with silvery pupils runs across the hind-wings between the marginal silvery spots and the inner row. This shows a certain relationship to *A. lathonia* (Linn.).

This is a very variable insect, and there are several well-marked Continental forms which are considered to belong to this species, but they are very different from the British insect. One of these is *A. chlorodippe*, Herr.-Schäff., which is green on the under surface of the hind-wings, with bright silvery spots;

Under side of the variety *A. cleodoxa*.

and another is *A. cleodoxa* (Esper), in which the pale spots are yellow, not silvery. The latter has occasionally been taken in England.

The larva is reddish, becoming olive-green as it grows older, with a white dorsal line, and blackish streaks or spots; it is very spiny, and the spines are lighter than the ground-colour. It feeds on sweet violet and wild heartsease in early summer.

THE NIOBE FRITILLARY. ARGYNNIS NIOBE.

(*Plate XIV., Figs.* 1, 2.)

Papilio niobe, Linn., Syst. Nat. (ed. x.), i., p. 48, no. 143 (1758); id., Faun. Suec. (ed. ii.), pl. 282, no. 1067 (1761); Esper, Schmett., i. (1), p. 247, pl. 18, fig. 4; i. (2), p. 124 pl. 75, fig. 3 (1777).

Argynnis niobe, Steph., Ill. Brit. Ent. Haust., i., p. 37 (1827); Kirby, Eur. Butterflies and Moths, p. 20 (1878); Lang, Butterflies Eur., p. 210, pl. 50, fig. 1, pl. 53, fig. 5, larva (1883); Barrett, Lepid. Brit. Isl., i., p. 165 (1892).

Var. α. *Argynnis eris.*

Argynnis eris, Meig., Eur. Schmett., i., p. 64, pl. 14, fig. 5 (1829).

Papilio cleodoxa (nec Ochsenh.) Esper, Schmett., i. (2), p. 3, pl. 94, fig. 3 (1782).

Argynnis niobe, var. *eris*, Lang, *l.c.*, p. 211, pl. 50, fig. 3 (1883).

This species has long been reputed British, and is said to be occasionally captured in the South of England, and therefore we have figured it in the present volume, though it has not yet been clearly established whether the supposed British specimens of *A. niobe*, if of truly British origin, were not really varieties of *A. adippe*. On the Continent, it is at least as common a species as the latter, and is met with at the same time of year.

This Fritillary is of the same size as *A. adippe*, and much resembles it. The row of black spots consists of six spots on the fore-wings (the gap mentioned in the description of *A. adippe* being filled up with a small spot) and five on the hind-wings. In the male, the nervures are not thickened; and there are one or two pale spots near the tip of the fore-wings in the female, which are wanting in typical *A. adippe*. The under side of the hind-wings is pale yellow, slightly tinged with green, and the pale spots are much more often yellowish (var. *A. eris*) than silvery. There is a row of four at the base, then three large ones (between these is a small black or silvery dot, wanting in *A. adippe*); generally traces of another row of smaller ones, next a row of seven rather large ones, the central

1. 2. *Argynnis adippe*
3. 4. *do lathoma*

one small; outside this is a row of red spots with silvery pupils, and a marginal row of seven silvery or yellow spots.

The larva is brownish, with a black dorsal stripe bordered with white, a black lateral stripe, and between the two some triangular white blotches. It feeds on *Viola dorsata* in May.

THE QUEEN OF SPAIN FRITILLARY. ARGYNNIS LATHONIA.

(*Plate XIII., Figs.* 3, 4.)

Papilio lathonia, Linn., Syst. Nat. (ed. x.), i., p. 482, no. 141 (1758); id., Faun. Suec. (ed. ii.), p. 282, no. 1068 (1761); Esper, Schmett., i. (1), p. 238, pl. 18, fig. 2 (1777).

Argynnis lathonia, Steph., Ill. Brit. Ent. Haust., i., p. 36 (1827); Kirby, Eur. Butterflies and Moths, p. 21, pl. 9, fig. 5 (1878); Lang, Butterflies Eur., p. 207, pl. 49, fig. 2 (1883); Barrett, Lepid. Brit. Isl., i., p. 170, pl. 25, figs. 1, 1a, 1b (1892).

Although this is the smallest British species of true *Argynnis*, only measuring two inches or less across the wings, it is, perhaps, the handsomest of all.

The wings are fulvous on the upper surface, with two rows of sub-marginal black spots, and the base is rather broadly black, with some additional black spots between this and the band. On the under surface the fore-wings are yellowish-fulvous, with a few oval silvery spots at the tip; the hind-wings have a row of very large oval silvery spots extending completely round them, and a large oval silvery spot in the centre. Between the central spot and the marginal spots there is a red band containing a row of silvery dots. The rest of the wing is of a yellowish-fulvous, but the large silvery spots cover the greater part of its surface.

This Fritillary is double-brooded, being found in early sum-

mer and again in autumn. It frequents lanes, open places in woods, clover-fields, and similar localities. It is a very scarce insect in the south of England, and has once or twice been taken in the south of Ireland, but is only to be met with casually, though it is much commoner on the Continent. It is not unlikely that it is occasionally passed over as *Satyrus megæra* (Linn.), which it somewhat resembles when flying, though it is a larger and brighter-coloured insect. A very closely-allied species, *A. issæa*, Gray, chiefly differing in the more yellowish fulvous of the wings, is common in the Himalayas.

The larva is brownish-green, with a white streak on the back and two brownish-yellow lateral streaks. The incisions are brownish-yellow, and the spines and feet are ochre-yellow. It is solitary, and feeds on Heartsease (*Viola tricolor*), Saintfoin (*Hedysarum medicaginis*), *Anchura officinalis*, and other low plants.

GENUS BRENTHIS.

Brenthis, Hübn., Verz. bek. Schmett., p 30 (1816); Schatz, Exot. Schmett., ii., p. 119 (1887).

The type of this genus has been given by Dr. Scudder as *B. hecate* (Denis), which is one of the smaller European species of true *Argynnis*, as that genus is at present understood. We therefore retain *Brenthis*, as used by Schatz, with *B. selene* as the type, only provisionally. If permanently used in this sense, however, the real type will be *B. thore* (Hübn.), a very dark-coloured Alpine and Scandinavian Butterfly, allied to *B. euphrosyne* and *B. selene*; for no other species congeneric with the latter was originally included in *Brenthis* by Hübner. This genus was formerly included sometimes with *Argynnis*, and sometimes with *Melitæa* (Curtis, indeed, indicated *B. euphrosyne* as the type of *Melitæa*, but erroneously), but is now frequently treated as distinct. It is really intermediate between

the two, resembling *Argynnis* in the general character of its markings, and especially in the silvery or purplish markings of the under surface, and *Melitæa* in its small size, and in its habits. The generic characters most resemble those of *Argynnis*, but the palpi are only slightly thickened, and on the fore-wings only one sub-costal nervule is thrown off before the end of the cell, while the median spur is wanting. In these characters it approaches *Melitæa*, but in *Brenthis* the tibiæ are encircled with spines. More important differences, however, are shown by the larvæ, which are furnished with branching spines in *Brenthis*, as is the case in typical *Argynnis*. The larvæ of *Brenthis*, like those of *Argynnis*, feed chiefly on violets.

Brenthis is a more widely-distributed genus than *Argynnis*. It is represented by numerous species throughout the Palæarctic Region, and among these several are Arctic and Circumpolar, and have been found almost as far north as our explorers have yet penetrated, while others are truly Alpine species. It is, however, poorly represented in North America, only two species, *A. bellona* (Fabr.), and *A. myrina* (Cram.), being generally common in the United States; but there is a little cluster of somewhat aberrant species found in Chili.

PEARL-BORDERED FRITILLARY. BRENTHIS EUPHROSYNE.

(*Plate XII., Figs.* 3, 4.)

Papilio euphrosyne, Linn., Syst. Nat. (x.), i., p. 481, no. 142 (1758); id. Faun. Suec. (ed. ii.), p. 282, no. 1069 (1761); Esper, Schmett., i. (1), p. 242, pl. 18, fig. 3; i. (2), pl. 114, pi. 72, fig. 3 (1777).

Melitæa euphrosyne, Steph., Ill. Brit. Ent. Haust., i., p. 135, pl. iv., fig. 4 (1827, var.).

Argynnis euphrosyne, Kirby, Eur. Butterflies and Moths, p. 18 (1878); Lang, Butterflies, Eur., p. 198, pl. 46, figs. 5, (1883); Buckler, Larvæ of Brit. Butterflies and Moths, i., p. 77, pl. 11, fig. 2 (1886); Barrett, Lepid. Brit. Isl., i., p. 174, pl. 25, figs. 2, 2a-f (1892).

This Butterfly is generally distributed throughout England, and is often very common in open spaces in or near woods in May, flitting from flower to flower, and is very easily captured. On the Continent it is double-brooded, but the autumn brood is rarely seen in England.

It measures about an inch and three-quarters across the wings, which are fulvous, with the base more or less broadly, and the hind-margins narrowly, black. Within the borders are two rows of black spots on all the wings, and there are several black spots and short transverse lines in the cell and elsewhere, towards the base. The outer marginal row of black spots is sometimes united into a festooned line, enclosing fulvous spots. The under surface of the fore-wings is marked as above, but is yellowish towards the margins, and the hind-wings are varied with red, with a marginal row of silvery spots, a silvery spot at the base, and a pale yellow central band, with one large silvery spot in the middle. There is also a conspicuous black spot in a yellow ring in the cell of the hind-wings.

The larva is black and spiny, with white lines, and reddish pro-legs. It feeds on different species of violet in June and September.

SMALL PEARL-BORDERED FRITILLARY. BRENTHIS SELENE.

(*Plate XV., Figs.* 1, 2.)

Papilio selene, Denis and Schiff., Syst. Verz. Schmett. Wien, p. 321, no. 11 (1776); Hübn., Eur. Schmett., i., figs. 26, 27, 732, 733, 783 (1803, &c.).

Papilio euphrosyne, var. Esper, Schmett., i. (1), p. 325, pl. 30, fig. 1 (1777).

Melitæa selene, Steph., Ill. Brit. Ent. Haust., i., p. 34 (1827); Curtis, Brit. Ent., ix., pl. 386 (1832).

Argynnis selene, Kirby, Eur. Butterflies and Moths, p. 18 (1878); Lang, Butterflies Eur., p. 197, pl. 46, fig. 4 (1883); Buckler, Larvæ Brit. Butterflies and Moths, i., p. 73, pl. 11, fig. 1 (1886); Barrett, Lepid. Brit. Isl., i., p. 178, pl. 26, figs. 1, 1a–f (1892).

Notwithstanding its trivial name of "Small" Pearl-bordered Fritillary, this Butterfly is very nearly of the same size as the last, which it much resembles in its habits and appearance, though it is generally a week or two later on the wing. It is at least as common an insect, and is also double-brooded, the second brood, though common on the Continent, being less frequently noticed in England.

Small Pearl-bordered Fritillary (*Argynnis selene*). Under side.

The markings of the upper surface of the wings closely resemble those of *B. euphrosyne*, though the spots towards the base have less tendency to form streaks and lines. The under surface of the hind-wings has a marginal row of silvery spots, followed by a purplish-red band with a large yellow spot in the middle; and next to this is an irregular band of silvery and yellow spots. Between this band and a basal row of silvery spots is another reddish band. The larva is black, with reddish-yellow spines, and brownish-red legs. It feeds on dog-violet, as is the case with other Fritillaries. Very curious aberrations of this species are occasionally met with, of one of which we have given a woodcut on the next page.

When I first met with these species, I took *B. euphrosyne* in a clearing in a wood in Sussex; and on revisiting the spot a few days later, took *B. selene*. I afterwards took the latter species by the side of a wood close to Brighton, where I never saw

Under side of a variety of *B. selene*.

B. euphrosyne; and I have always found *B. selene* far more abundant than *B. euphrosyne* near Düsseldorf, in Germany, especially in autumn, when it is one of the commonest Butterflies in the woods.

WEAVER'S FRITILLARY. BRENTHIS DIA.

(*Plate XIV., Fig.* 5, 6.)

Papilio dia, Linnæus, Syst. Nat. (ed. xii.), i., pt. 2, p. 785, no. 277 (1767); Esper, Schmett., i., pt. 1, p. 221, pl. 14, fig. 4; i., pt. 2, p. 66, pl. 61, fig. 2 (1777).

Melitæa dia, Steph., Ill. Brit. Ent. Haust., i., p. 34 (1827).

Argynnis dia, Kirby, Eur. Butterflies and Moths, p. 18, pl. 9, fig. 1 (1878); Lang, Butterflies Eur., p. 203, pl. 48, fig. 1 (1883); Barrett, Lepid. Brit. Isl., i., p. 183 (1892).

The present species derives its English name from Richard Weaver, a celebrated collector and dealer in English insects, who flourished fifty or sixty years ago. He had a specimen which he believed to have been taken by himself in Sutton

1. 2. Argynnis niobe
3. 4. Melitæa athalia.
5. 6. Brenthis dia.

Park, near Birmingham. Other examples have been taken in England from time to time, but so rarely that very few entomologists are disposed to admit the claims of this Fritillary to be considered a British species. On the Continent, however, it is not an uncommon Butterfly in woods, and is double-brooded like its congeners, appearing both in spring and autumn.

It is a somewhat smaller insect than the other species, measuring about an inch and a quarter across the wings, which are fulvous, with the base black, and the margins likewise black, with a festooned line, inclosing rather large fulvous spots; within this is a row of rather large black spots, and the remainder of the wings is likewise rather more heavily spotted with black than in the allied species. The under side of the hind-wings is black at the base, followed by a band of three silvery and three yellow spots; between these and the silvery marginal spots is a purple band; and a row of black spots with white pupils runs parallel to the marginal spots.

The larva is dark brown or black, the back paler, intersected by a black dorsal line, the spines alternately black and reddish; legs black. It feeds on different species of violet.

During the last fifty years, several species of Butterflies have become actually or very nearly extinct in England, and others, formerly not uncommon, have become much restricted in their range. It is probable that this process has been going on for a long time, and that some of the species included by the older authors, but now removed from our lists, were species already disappearing when the study of entomology first commenced. It is possible that *B. dia* is one of those Butterflies which may have been formerly common, but are now on the verge of extinction in England; for it is not a species likely to be accidentally introduced into this country.

EXOTIC GENERA ALLIED TO ARGYNNIS.

There are several genera closely allied to *Argynnis* (as

regards the colour of the upper surface of the wings) in Asia, Africa, and America, but none possess the characteristic silvery markings on the under surface. Several of these are adorned with transverse rows of spots, which are sometimes ocellated on the under surface.

Ethiopian Region.

There are only two genera of this group found in Africa, if we except *Argynnis* itself, the South European species of which extend to the African coast of the Mediterranean.

One of these, *Lachnoptera*, Doubleday, contains a few species confined to Africa. The best known of these is the West African *L. iole* (Fabricius), in which the sexes are very dissimilar, an unusual character in the present group. The male is tawny above, with a marginal black line, a festooned submarginal line, and within it a row of black spots. The hind-wings are slightly angulated, and have two festooned submarginal lines, and no marginal line; the apical half of the hind-wing has a large dark patch, by which this Butterfly can be at once distinguished from any other, and there are two black spots towards the anal angle. On the under surface the colour is yellowish-tawny, and on the hind-wings the dark patch has disappeared, but there is an interrupted row of black spots across the wings, more or less distinctly pupillated with white, and edged within with a pearly-grey band. The female, which was originally described by Hewitson, under the name of *Harma hecatæa*, is brown, with the outer half of the wings white nearly to the hind-margin, the white space being bordered and intersected with brown lines. There are four brown spots on the hind-wings, on the white band, two towards the costa, and two towards the anal angle. The under side is pearly-grey, with a slight pinkish lustre, and marked with brown and tawny lines on the hind-wings; there are three eyes towards the costa, and two near the anal angle,

pupilled with white. A closely allied species, *L. ayresii* Trimen, is found at Natal, but in this case both sexes are reddish-fulvous, with a black blotch on the middle of the costa of the fore-wings. It is described as a very pugnacious insect, flying up and down at the edges of woods at a height of from six to ten feet from the ground, and attacking and driving away other Butterflies.

The only other African genus allied to *Argynnis*, which we need notice, is *Atella* of Doubleday. The few species much resemble the East Indian forms to be noticed in the next section. One of them, *Atella phalanta*, Drury, is found in both the Ethiopian and Indian Regions.

Indian and Austro-Malayan Regions.

These Regions, which it is often most convenient to treat as one, as in the present case, possess several remarkable genera of the *Argynnis* group, in addition to *Argynnis*, *Cethosia* and *Cynthia*, which we have already discussed. They all extend to India or South China (except, perhaps, *Terinos*), and are represented by numerous species in the different islands between India and Australia.

Among these genera, *Terinos* of Boisduval is one of the most remarkable, as it departs altogether from the usual style of coloration in the group. It consists of handsome Butterflies, usually measuring above three inches across the wings, which are dark brown or black, often adorned with masses of rich purple above, and paler below, with a row of large black spots on the disc, bordered within by a festooned grey or purplish-grey line. Many species are adorned with grey or reddish blotches towards the tips of the fore-wings, and the anal angle of the hind-wings. The fore-wings are longer than the hind-wings, and the latter are somewhat angulated and dentated.

The genus *Cirrochroa*, Doubleday, brings us back to the

familiar tawny colouring of *Argynnis*, and the species are of about the same size as our English ones, measuring three inches across, or rather less, but the fore-wings are shorter, and the hind-wings are rather long and less rounded. These Butterflies are tawny above, with brown borders, and with festooned sub-marginal lines, followed by an inner row of spots. On the under surface they are paler, and generally ornamented with one or two straight brown lines, often edged with white.

The genus *Messaras*, Doubleday, includes species measuring rather less than three inches in expanse. The fore-wings are longer than the hind-wings, and the latter are rounded and scalloped. The wings are tawny, and the hind-margin of the fore-wings is generally brown, edged within by a broad yellowish band; the hind-wings are marked with several festooned lines, and an inner row of spots, and on the under side usually with a row of large sub-marginal black spots, more or less bordered with pearly-white lines; sometimes these markings are reproduced above. Other species are uniform brown, with a broad orange-yellow band across both wings.

The last genera of this group belonging to these regions which we shall notice are *Atella*, Doubleday, and *Cupha*, Billberg. In these genera the fore-wings are longer and more pointed than in *Messaras*, but the hind-wings are rounded and scalloped. As in so many of the Eastern *Argynnides*, the wings are tawny, often with narrow brown borders, festooned sub-marginal lines, and at least one inner row of black spots. On the under surface the markings are somewhat irregular, purplish-brown and pearly-grey. The largest species measure nearly three inches in expanse, but many of those inhabiting the islands are much smaller. This genus has similar habits to *Argynnis*, to which it is allied, and the larvæ feed on various trees, especially willow. *Cupha* may be distinguished from *Atella* by the slightly angulated hind-wings.

Nearctic and Neotropical Regions.

As already mentioned, *Argynnis* is better represented in temperate America than almost any other genus of the larger Butterflies; while *Brenthis*, though not numerous in American species, extends down to Chili and the extreme south-west of South America. There are, however, two interesting genera of the *Argynnis* group which are peculiar to America, *Clothilda*, Blanchard, and *Euptoieta*, Doubleday.

Clothilda is a very handsome genus, consisting of large Butterflies measuring four inches across the wings, and greatly resembling *Argynnis*. There are several species inhabiting the larger West Indian Islands which are brownish-tawny, with transverse rows of large brown spots, the under surface of the hind-wings marked with irregularly undulated yellowish and whitish lines and spaces on a darker ground. On the mainland of Mexico and Central America we find still handsomer brown and yellowish-grey species, which become black towards the base of the fore-wings, with the middle third of the wing on both sides filled up with alternate black and rosy markings.

Euptoieta is found in all parts of America, frequenting open grassy country. There are, however, only two or three species measuring from two to nearly three inches across the wings. They much resemble the non-caudate group of *Atella* in shape, size, and markings, but the fore-wings are longer at the apex, and the under surface is much more uniform in colour, without whitish lines, or distinctly-formed eyes; though a row of small sub-marginal white spots, corresponding to larger black ones above, is sometimes visible.

GENUS MELITÆA.

Melitæa, Fabr. in Illiger, Mag. Insekt., vi., p. 284 (1807); Doubl., Gen. Diurn. Lepid., p. 177 (1848); Schatz, Exot. Schmett., ii., p. 120 (1887).

Type *M. cinxia* (Linn.).

The genus *Melitæa* includes all the smaller European Fritillaries which are not marked with silver or purplish on the under surface, except the Duke of Burgundy Fritillary (*Nemeobius lucina*). This is the only British, and indeed almost the only European, representative of the family *Lemoniidæ*, and consequently a species which will find its proper place in our second volume. *N. lucina*, apart from its structural differences and much smaller size, may be at once distinguished by the prevailing colour being blackish, with tawny spots, all isolated, and those towards the margins of the hind-wings enclosing black dots.

The generic characters of *Melitæa* are similar to those of *Brenthis;* the club of the antennæ is moderately long, very large and flattened, and the fore-wings are rather longer than in *Brenthis*, with no median spur, and the hind-margins of all the wings are rounded and slightly denticulated. The tibiæ and tarsi of the four hinder legs are furnished with two or three rows of bristles on the under side only. The palpi are hairy, but not thickened. The larvæ are provided with short hairy warts, but are not set with branding spines, as in *Argynnis* and *Brenthis*.

The genus *Melitæa* is widely spread throughout the Palæarctic Region, and is likewise found in North America, where it is especially numerous in California. Most of the North American species belong to a peculiar group, generally exceeding the European species in size, and of a black colour, more or less spotted with white and red. But in South America the genus is replaced by the allied genera *Phyciodes*, Hübner, and *Eresia*, Boisduval, the former of which is likewise numerous in North America.

Our three British species of *Melitæa* are representative of the three European groups of the genus. The larvæ feed on plantain, scabious, and other plants growing on waste ground,

1. 2. Brenthis selene.
3. 4. Melitæa aurinia.
5. 6. " tonia.

and as over-cultivation rapidly exterminates such plants, and as insects as a rule are far less generally distributed, and much more easily destroyed than the plants on which they feed, it is not surprising that the species of *Melitæa* are among those Butterflies which are rapidly becoming more and more scarce and local in England, and are within measurable distance of extinction as British species. They are gregarious, and are therefore still common in those localities where they are permitted to exist at all. A century ago they were probably as generally distributed in England as they are at present in most places on the Continent. Their absence in Corsica and Sardinia is somewhat remarkable.

These Butterflies have a slow flight, flitting from flower to flower on heaths, meadows, open places in woods, and similar localities where their food-plants are to be met with.

THE GREASY FRITILLARY. MELITÆA AURINIA.

(*Plate XV., Figs.* 3, 4.)

Papilio aurinia, Rott., Naturforscher, vi., p. 5 (1775).

Papilio artemis, Denis and Schiffermüller, Syst. Verz. Schmett. Wien, p. 322, no. 10 (1776); Hübner, Europ. Schmett., i., figs. 4–6, 653 (1803?).

Papilio maturna (nec Linn.), Esper, Schmett., i. (1), p. 209, pl. 16, fig. 2 (1777).

Melitæa artemis, Steph., Ill. Brit. Ent. Haust., i., p. 32 (1827) Buckler, Larvæ Brit. Butterflies and Moths, i., p. 84, pl. 12, fig. 2 (1886); Barrett, Lepid. Brit. Isl., i., p. 196, pl. 27, figs. 2, 2a–f (1893).

Melitæa aurinia, Kirby, Eur. Butterflies and Moths, p. 15, pl. 8, figs. 3–a-d (1878); Lang, Butterflies Eur., p. 183, pl 43, fig. 2 (1883).

The Greasy Fritillary, though very local, is widely distributed in all parts of the kingdom, and is rather variable. It is by

far the commonest of the three British species of *Melitæa*. It appears in May and June, generally frequenting damp meadows, though it may be found in dry places also. It represents the section of *Melitæa* in which the upper side of the wings is marked with white or yellow spots, paler than the ground colour.

This species measures about one and a half inches across the wings, or a little more, though some of the large South European forms, which are considered to be conspecific, sometimes exceed two inches in expanse. The fore-wings are of a deep fulvous, marked with several rows of pale yellow spots, separated by black lines; the hind-wings are fulvous, with some yellowish spots near the base, and there is a row of yellow spots across the centre, and a row of black dots near the hind-margin. The hind-margins of all the wings are narrowly black, and there are a few yellow dots within the border of the hind-wings. The under side is similar, but paler, and the markings are most distinct on the hind-wings. The whole of the under surface of the wings has a peculiar glossy appearance, which has suggested the name of the Butterfly.

The larva is black above, with several rows of small white dots; it is yellow beneath, and the legs are reddish. It feeds on plantain, scabious, and other low plants, in April.

THE GLANVILLE FRITILLARY. MELITÆA CINXIA.

(*Plate XI., Figs.* 3, 4.)

Papilio cinxia, Linn., Syst. Nat. (ed. x.), i., p. 480, no. 137 (1758); id. Faun. Suec. (ed. ii.), p. 280, no. 1063 (1761).

Papilio delia, Denis and Schiff., Syst. Nat. Lepid. Wien, p. 179, no. 6 (1776); Hübn., Eur. Schmett., i., figs. 7, 8 (1790).

Papilio cinxia major, Esper, Schmett., i., p. 312, pl. 25, fig. 2 (1778).

Melitæa cinxia, Steph., Ill. Brit. Enc. Haust., i., p. 33 (1827); Kirby, Eur. Butterflies and Moths, p. 15, pl. 8, figs. 5, a–d (1878); Lang, Butterflies Eur., p. 185, pl. 44, fig. 1 (1883); Buckler, Larvæ Brit. Butterflies and Moths, i., pl. xi., figs. 3, 3a (1886); Barrett, Lepid. Brit. Isl., i., p. 190, pl. 27, figs. 1, 1, a–d (1892).

The Glanville Fritillary is the most local species of the genus, and is at present almost confined, in England, to a few localities in the Isle of Wight. It represents a section of the genus *Melitæa* in which the under surface of the hind-wings is marked with rows of conspicuous black spots, and not simply with lines. It derives its name from a certain Lady Glanville who lived in the reign of Charles II. After her death, it was attemped to set aside her will on the ground of insanity, the principal evidence relied upon by the disputants being her fondness for collecting Butterflies. The species appears in May and June, like the other smaller Fritillaries, but, as a rule, prefers drier localities.

The Butterfly expands about three-quarters of an inch, and is fulvous, with numerous black dashes and interrupted lines; the base and hind-margins are black. The fore-wings are pale fulvous beneath, with a few black dots; the tip is yellow. The hind-wings are fulvous, with some yellow spots near the base; a broad yellow band extends across the middle, and there is a row of yellow marginal spots. The yellow markings are more or less bordered with black, and there is a row of black spots intersecting the central band, another row on the marginal series, and several others near the base.

The larvæ are black, with transverse rows of white dots, and the head and pro-legs are tawny. They feed on the narrow-leaved plantain (*Plantago lanceolata*), mouse-ear, hawk-weed (*Hieracium pilosella*), and the common germander speed-well (*Veronica chamædrys*). They generally issue from the

egg towards the end of autumn, and pass the winter before they undergo their final metamorphosis. To protect themselves against the weather, they assemble in little colonies, and form a kind of tent by drawing together some of the leaves of the plant on which they feed, and covering the whole with a web of silk.

THE PEARL-BORDERED LIKENESS FRITILLARY. MELITÆA ATHALIA.

(*Plate XIV., Figs.* 3, 4.)

Papilio athalia, Rott., Naturf., vi., p. 5 (1775); Esper, Schmett., i. (1), p. 377, pl. 47 (1777).

Melitæa athalia, Steph., Ill. Brit. Ent. Haust., i., p. 30 (1827); Kirby, Eur. Butterflies and Moths, p. 16, pl. 8, figs. 7, a–c (1878); Lang, Butterflies Eur., p. 121, pl. 45, fig. 3 (1883); Buckler, Larvæ Brit. Butterflies and Moths, i., p. 81, pl. 12, fig. 1 (1886); Barrett, Lepid. Brit. Isl., i., p. 185, pl. 2, 2a–e (1892).

Var., *Melitæa tessellata.*

Melitæa tessellata, Stephens, *l.c.* i., p. 31, pl. 5, figs. 1, 2 (1827).

This Butterfly is the commonest of the whole genus on the Continent, being abundant everywhere in woods and meadows; but it is a very local insect in the south of England, though widely distributed; it is met with in May and June, like the other small Fritillaries. It represents the group of *Melitæa*, wherein the species are characterised by being fulvous and black above, in varying proportions (but with no paler spots), and in having the hind-wings below yellow, with black lines and markings, but with no distinct black spots. It was formerly a much more abundant insect in England than at present, and was common even on Hampstead Heath.

It measures from one inch and a half to an inch and three-quarters across the wings, which are tessellated in about equal proportions with black and fulvous. The under side of the fore-wings is pale fulvous, with the black bands of the upper surface only visible towards the costa; the hind-mar-

The Heath Fritillary (*Melitæa athalia*). Upper and under side of Varieties from the collection of the late Mr. F. Bond.

gin is straw-coloured. The hind-wings are yellowish-brown below, with yellow spots near the base, edged with black, and a row of large yellow spots, separated by the nervures, across the centre, bordered and partly intersected with black. The fringe is yellowish-white, spotted with black.

The larva is black, with two rows of small white dots on

each segment, and with tubercles of the same colour on the sides. It feeds on different species of plantain in May.

This is a Butterfly which is liable to many varieties, and the central figure on the previous page nearly corresponds to the form called *M. tessellata* (Steph.).

THE STRAW MAY FRITILLARY. MELITÆA PYRONIA.

(*Plate XV., Figs.* 5, 6.)

Papilio pyronia, Hübner, Eur. Schmett., i., figs. 585, 586 (*c.* 1800).

Papilio eos, Haworth, Lepid. Brit., p. 35, no. 43 (1803).

Melitæa pyronia, Steph., Ill. Brit. Ent. Haust., i., p. 31, pl. iv., figs. 1, 2 (1827).

Very dark varieties, or rather aberrations, of several genera of *Nymphalinæ* are not uncommon, and that represented on our plate is a sport of *M. athalia*. A specimen like the one figured is said to have been taken at Peckham in 1803; and similar examples have also been met with occasionally both in England and on the Continent.

This insect, which measures a little more than an inch and a half across the wings, has tawny fore-wings, with the nervures, as well as some confluent markings towards the base, and a sub-marginal line, black; the fringes of all the wings are spotted with black and white. The hind-wings are black, with a tawny spot near the base, and a sub-marginal row of tawny spots. On the under side the fore-wings are tawny with the tip and hind-margin yellow, and showing numerous large black spots towards the base; the fringes have a black line at the base, and are spotted with black, and there is also a sub-marginal row of nearly connected black spots. The hind-wings are reddish below, towards the base, with black blotches; the basal area is bordered by a black line, beyond which is a very broad whitish band, followed by a row of reddish lunules bordered on both sides

with black; outside this, the marginal area is yellow, and similarly marked to the corresponding portion of the fore-wings.

EXOTIC GENERA ALLIED TO MELITÆA.

Nearctic and Neotropical Regions.

The genus *Melitæa* is well represented in most parts of North America; but in Tropical America, as before stated, it is replaced by several closely-allied genera, of which the most important are *Phyciodes*, Hübner, and *Eresia*, Doubleday. *Phyciodes*, indeed, extends over the greater part of North America as well. These Butterflies much resemble the small species of *Melitæa*, measuring from an inch to an inch and a half across the wings, which are generally brown, with red, yellow, tawny, and white spots and markings. The fore-wings are broad, and not much longer than the hind-wings, which are rounded, slightly denticulated, and frequently covered like the fore-wings. The species inhabit open or bush-covered land.

Eresia includes species somewhat similarly coloured, but larger, measuring from an inch and a half or two inches across the wings. They are forest insects, with longer and narrower fore-wings than *Phyciodes;* and many of the species greatly resemble small species of *Heliconius*, or some of the black and tawny species of the Sub-family *Ithomiinæ*, from which, however, they may be at once distinguished by their open hind wing-cells.

Anemeca ehrenbergii (Hübner) is a curious Mexican species, measuring about two inches across the wings, which are black, with long whitish radiating lines on the outer half. The hind-wings are very pale yellowish-white beneath, with broad black nervures. The wings are rather long, the fore-wings being rather longer than the hind wings, and the hind-margins are rounded.

The genus, *Chlosyne*, Butler, includes several species found in Mexico, Central America, and the northern parts of South America, which form a transition from the genera allied to *Melitæa* to the genera allied to *Vanessa*. They measure from an inch and a half to two inches across the wings, which are usually of a brown or black colour, more or less varied or spotted with yellow, white, or tawny above, and often with red spots on the under side of the hind-wings. The fore-wings are usually more or less produced at the tip, and the hind-wings are rounded and dentated.

GENUS ARASCHNIA.

Araschnia, Hübner, Verz. bek. Schmetterl., p. 37 (1816).

Type, *A. levana* (Linn.).

We have not been able to find space for figures of this genus, but it is so well known, and of so interesting a type, that we must not pass it over unnoticed. It contains a very few species of small size, which are confined to Europe and Northern Asia. The antennæ have an oval club, the palpi are very hairy, and the eyes are also hairy. The wings are denticulated, the fore-wings triangular, slightly projecting at a third of their length from the tip, and slightly concave from below this point to a smaller projection, situated a little above the hinder angle; the hind-wings are nearly square, with a slight projection at the outer angle.

There are two very distinct seasonal forms in each species of this genus, viz., the spring brood, which is tawny with black spots; and the summer brood, which is black with white spots, which form an irregular band across the wings. Weismann and other philosophical writers have written much on the European species, as its seasonal dimorphism is considered to throw some light on problems connected with the origin of species.

THE MAP BUTTERFLY. ARASCHNIA LEVANA.

Spring brood.

Papilio levana, Linn., Syst. Nat. (x.), i., p. 480, no. 133 (1758); Esper, Schmett., i., pt. 1, p. 201, pl. 15, fig. 2 (1777); i., pt. 2, p. 55, pl. 59, fig. 5 (1780); Ochsenh., Schmett. Eur., i., p. 132 (1807).

Cynthia levana, Steph., Ill. Brit. Ent. Haust., i., p. 49 (1827).

Vanessa levana, Kirby, Eur. Butterflies and Moths, p. 14 (1878); Lang, Butterflies Eur., p. 167, pl. 38, fig. 4 (1882).

Summer brood.

Papilio prorsa, Linn., Syst. Nat. (x.), i., p. 480, no. 134 (1758); Esper, Schmett., i., pt. 1, p. 205, pl. 15, fig. 3 (1777); i., pt. 2, p. 52, pl. 59, fig. 4 (*c.* 1780); Ochsenh., Schmett. Eur., i., p. 129 (1807).

Vanessa prorsa, Kirby, Eur. Butterflies and Moths, p. 74, pl. 7, figs. 4a, 6 (1878).

Vanessa levana, var., *prorsa*, Lang, Butterflies Eur., p. 168, pl. 39, fig. 2 (1882).

Intermediate Form.

Papilio porima, Ochsenh., Schmett. Eur., i., p. 124 (1807).

Vanessa porima, Kirby, Eur. Butterflies and Moths, p. 14 (1878).

Vanessa levana, var. *porima*, Lang, Butterflies Eur., p. 168, pl. 39, fig. 1 (1882).

As already mentioned, this Butterfly presents two apparently very dissimilar forms, which Linnæus called *Papilio levana* and *P. prorsa*, and by these names they have been known ever since. They are found more or less commonly in Central Europe, but do not reach either to the extreme northern or the extreme southern countries, though they are

met with in Western Asia and Siberia. *A. levana* has been said to have been taken in Great Britain, but apparently only through the error of Dr. Turton, who translated the "Systema Naturæ" of Linnæus into English many years ago, and marked various species as British, almost at random, *e.g.*, *A. levana*.

The summer brood (*A. prorsa*) measures rather less than an inch and a half across the wings, which are black, with a red marginal line. There is also a rather broad white band, interrupted on the fore-wings, and rather irregular, but broadest in the middle on the hind-wings. The fore-wings are also marked with a few white dots outside the upper part of the white band. The under side is brownish-red, with the white band reproduced; the hind-margins are dull white, and there are some whitish dashes near the base.

The spring brood (*A. levana*) is fulvous, with scattered black spots. There are also three white spots near the tip of the fore-wings, and a row of black spots across all the wings. On the under side the Butterflies resemble each other more than on the upper, but the under side of the *A. levana* form is more yellow, and the white band is narrower and less conspicuous.

The larva is spiny, and of a black or greyish colour, dotted with white; the spines are black or yellow, and the fore-legs are black, with the extremities yellow. It feeds on nettle in June and September.

EXOTIC GENERA ALLIED TO ARASCHNIA.

The genus *Symbrenthia*, Hübner, includes some East Indian species, measuring about an inch and a half across the fore-wings. They are brown, with fulvous markings, consisting of a band in the cell of the fore-wings, an interrupted one

beyond, and two or three on the hind-wings; in some species the females are marked with white, instead of fulvous. In colour and markings, though not in shape, they greatly resemble *Neptis*, also an East Indian genus. The wings are very short and broad, the fore-wings being scarcely longer than the hind-wings, and the latter are obtusely angulated in the middle of the hind-margin, where there is a projecting angle; the extremity of the inner-margin is slightly sloped outwards, so as to form almost a right angle at the anal angle of the wing.

S. hyppocla (Cramer), the commonest Indian species, flies very swiftly, but often settles; its larva feeds on nettle.

Hypanartia, Hübner, is a Tropical American genus, resembling *Symbrenthia*, but larger (measuring two or three inches in expanse), and with longer fore-wings, which are generally strongly concave in the middle; the hind-wings are more rectangular, with a strong tooth or short tail at the outer angle. They are usually tawny, with the apical region of the fore-wings brown, and spotted with white or tawny. In *H. lethe* (Fabr.), a tawny species, the fore-wings are not concave; while *H. dione* (Latr.) is a brown insect with darker transverse bands, and a rather longer tail, which might easily be mistaken for a species of *Megalura* at first sight, but for the concavity on the fore-wings. There are one or two species found in Africa, Mauritius, &c., which have a shorter interval and an additional tooth or tail, between the principal tail and the anal angle of the hind-wings. One of these, *H. delius* (Drury), which inhabits West Africa, is brown and tawny, having considerable resemblance to the South American *H. lethe;* while other species, found in Africa and in the island of Nossi-Bé, near Madagascar, Mauritius, Bourbon, &c., much resemble a rather small pale-tailed *Pyrameis atalanta.* Mr. Trimen states that their habits are very similar to those of *Pyrameis.* The larvæ feed on nettle.

GENUS POLYGONIA.

***Polygonia*, Hübner**, Verz. bek. Schmett., p. 36 (1816).
***Grapta*, Kirby, Faun.** Bor. Amer., iv., p. 292 (1837); Doubl., Gen. Diurn. Lepid., i., p. 195 (1848); Stainton, Man. Brit. Butterflies and Moths, i., p. 40 (1857); Schatz, Exot. Schmett., ii., p. 124 (1887).

Type, *Polygonia c.-album* (L.).

Antennæ with the club oval, gradually formed, truncated at the end; palpi thickly scaled above, less so on the back and sides, and the scales small and conical, interspersed only with a few hairs; eyes hairy. Wings with the hind margins much dentated, the fore-wings deeply concave below the tip, and the inner margin concave; hind-wings with a short tail in the middle of the hind margin, and the inner margin grooved to receive the abdomen. A white letter-like mark on the under side of the hind-wings.

This genus is peculiar to the Palæarctic and Nearctic Regions. In the Old World it does not extend to the Himalayas, though one of the Chinese species, *P. c.-aureum* (Linn.), has been, rightly or wrongly, reputed to occur as far south as Penang. There are only two recognised European species, one, *P. c.-album* (Linn.), generally distributed, while the other, *P. egea* (Cramer), a lighter-coloured species, with a triangular, instead of a semicircular, white mark on the hind-wings beneath, belongs to the Mediterranean Sub-region, being found in South Europe, Asia Minor, and Syria. *Polygonia*, however, is one of the very few genera of Butterflies that are better represented in the Nearctic than in the Palæarctic Region; and, in addition to species allied to ours, several very large forms, measuring nearly three inches across the wings, are found in the United States; and one species extends as far south as Mexico.

1. 2. Polygonia C. album
3. Vanessa polychloros

THE COMMA BUTTERFLY. POLYGONIA C.-ALBUM.

(*Plate XVI., Figs.* 1, 2.)

Papolio c.-album, Linn., Syst. Nat. (x.), i., p. 477, no. 115 (1758); id. Faun. Suec. (ii.), p. 279, no. 1059 (1761); Esper, Schmett., i., pt. i., p. 175, pl. 13, fig. 3 (1777); i., pt. 2, p. 53, pl. 59, fig. 3 (1780 ?).

Vanessa c.-album, Steph., Ill. Brit. Ent. Haust., i., p. 42 (1827); Kirby, Eur. Butterflies and Moths, p. 13, pl. 7, figs. 2, a–d (1878); Lang, Eur. Butterflies, p. 170, pl. 39, fig. 4 (1882); Barrett, Lepid. Brit. Isl., i., p. 121, pl. 18, figs. 1, 1, a–e (1892).

Grapta c.-album, Buckler, Larvæ Brit. Lepid., i., pp. 57, 182 pl. ix., fig. 3 (1886).

The Comma Butterfly was formerly much more abundant in England than at present, and has almost entirely disappeared from the south of England, where it was once abundant, within the last fifty or sixty years, though there are many localities in the midland and northern counties of England, as well as in Wales, where it may still be met with. It is a hedgerow insect, and is fond of settling on the ground and on the tree-trunks, and is frequently found in company with *Vanessa polychlorus*. It appears in June and July, and hibernated specimens are sometimes seen in spring.

The Comma Butterfly usually measures nearly two inches across the wings, which are deep fulvous, with the hind-margins brown. The fore-wings have three black spots on the costa, three in the centre, and one on the inner margin. The hind-wings are ornamented with black and brown. The under surface is sometimes dark brown, but is often varied with greenish or yellowish, and there is always a white mark like the letter *C* on the under side of the hind-wings.

The larva is reddish in front and white behind. The head

is nearly heart-shaped, and bears two large hairy tubercles, one on each side, resembling ears. It is found in June and July, and consumes the foliage of various trees, shrubs, and herbaceous plants, such as the elm, willow, currant, hazel, honeysuckle, and common nettle.

GENUS VANESSA.

Vanessa, Fabr. in Illiger, Mag. Insekt., vi., p. 281 (1807); Latr., Enc. Méth., ix., pp. 10, 291 (1819); Doubl., Gen. Diurn. Lepid., p. 195 (1848); Schatz, Exot. Schmett., ii., p. 124 (1887).

Type, *V. polychlorus* (L.).

Antennæ, with the club gradually thickened and rather long, the last joint short and obtuse. Palpi thickly clothed with broad scales in front, and set with long stiff bristles all round; eyes hairy. Wings dentated, the fore-wings with a slight projection below the tip and with a slight concavity below, the inner margin nearly straight; hind-wings with a short projection in the middle of the hind margin.

Larvæ gregarious, spiny, except on the first segment behind the head; pupa frequently metallic.

This genus is peculiar to the northern hemisphere, and though not very numerous in species, contains some of our commonest and handsomest Butterflies, such as the Peacock and the Tortoise-shells. Most of the species inhabit the temperate climates of Europe, Asia, and America, but one or two extend as far south as India, Ceylon, and the Malay Peninsula; as well as to Mexico in the New World.

Most of the species appear in summer, and hibernate, reappearing in spring, often in fairly good condition.

THE LARGE TORTOISE-SHELL. VANESSA POLYCHLORUS.

(*Plate XVI., Fig.* 3.)

Papilio polychloros, Linn., Syst. Nat. (x.), i., p. 477, no. 113 (1758); id. Faun. Suec. (ii.), p. 278, no. 1057 (1761); Esper, Schmett., i., pt. 1, p. 166, pl. 13, fig. 1 (1777).

Vanessa polychloros, Steph., Ill. Brit. Ent. Haust., i., p. 42 (1827); Kirby, Eur. Butterflies and Moths, p. 22, pl. 6, fig. 5 (1878), Lang, Butterflies Eur., p. 171, pl. 39, fig. 5 (1882); Barrett, Lepid. Brit. Isl., i., p. 127, pl. 18, figs. 2, 2a, b (1892); Buckler, Larvæ Brit. Butterflies and Moths, i., p. 54, pl. 9, fig. 1 (1886).

The Large Tortoise-shell Butterfly is not uncommon in many parts of the south of England, in and near woods, or flying about detached trees, on the trunks of which it frequently settles. It may sometimes be seen in gardens, settling on flowers, but less frequently. It appears in summer and autumn, and hibernated specimens, much duller in colour than the newly-emerged individuals, may be found in early spring.

The Butterfly measures two and a half inches, or more, across the wings, which are of a deep fulvous with rather broad black margins. The fore-wings are marked with three rather large black costal blotches, separated by pale yellow spots; there are also three black spots in the centre of the wings, and a fourth near the hinder angle. The hind-wings have a large black blotch in the centre of the costa, bounded externally by a pale yellow blotch, and only the border of the hind-wings is marked with blue lunules. The under side is dull brown, with a yellowish mark in the middle of the hind-wings.

The larva is blackish or brownish, with a yellow stripe on the sides, and the spines are likewise yellow. When young, the larvæ live under a silken web, which they spin for their protection, but they disperse after the first moult. They feed

trees, a habit which on the Continent causes the insect to be sometimes regarded as injurious, but in England it is not sufficiently plentiful to cause any material damage. The pupa is flesh-coloured, with golden spots.

Two other species closely allied to this are found in Eastern Europe. One, *V. xanthomelæna*, Denis, extends to Northern India, and the other, *V. v.-album*, Denis, is hardly distinguishable from the North American *V. j.-album* of Boisduval.

THE SMALL TORTOISE-SHELL. VANESSA URTICÆ.

(*Plate XVIII., Fig.* 1.)

Papilio urticæ, Linn., Syst. Nat. (x.), i., p. 477, no. 114 (1758), id. Faun. Suec. (ii.), p. 218, no. 1058 (1761); Esper, Schmett., i., pt. 1, p. 170, pl. 13, fig. 2 (1777).

Vanessa urticæ, Steph., Ill. Brit. Ent. Haust., i., p. 43 (1827); Kirby, Eur. Butterflies and Moths, p. 12, pl. 6, fig. 4 (1878); Lang, Butterflies Eur., p. 173, pl. 40, fig. 3 (1882); Barrett, Lepid. Brit. Isl., i., p. 131, pl. 19, figs. 1, 1, a–c (1892); Buckler, Larvæ Brit. Butterflies and Moths, pp. 55, 181, pl. ix., fig. 2 (1886).

Although this Butterfly is gregarious, and feeds on nettles, yet even nettles are by no means so abundant as formerly, and the species is thus much less common than it used to be. Still it is to be met with in all parts of the country, in gardens, weedy places, lanes, open places in woods, &c., and as it hibernates, and has a succession of broods, there is not a month in the year when it may not be found, for an unusually fine day or artificial warmth will sometimes tempt it from its hiding-place, even in mid-winter.

The Butterfly generally measures about two inches across the wings, which are reddish-orange, with black hind-margins, spotted with blue on all the wings. The fore-wings have three black costal spots separated by yellowish ones, and the outer-

Small Tortoise-shell. Variety 1.

Small Tortoise-shell. Variety 2.

Small Tortoise-shell. Variety 3.

most separated from the hind-margin by a white costal spot. There is also a large black spot near the inner-margin, with a yellowish one outside it, and two small black ones in the centre of the fore-wings. The hind-wings have a broad basal area of black, with a wide reddish-orange band between this and the hind-margin. The underside is varied with light brown and yellowish.

The larvæ feed on nettle, and when first hatched live together in small colonies, but disperse as they grow larger and require more food. They are blackish and spiny, with yellowish stripes on the back and sides. The pupa is beautifully gilded.

In Corsica and Sardinia this species is replaced by *V. ichnusa* (Bonelli), an insect of a more pronounced red colour, in which the two small spots on the disc of the fore-wings are wanting. Other species resembling *V. urticæ*, but more remotely, are found in North America and Northern India.

We add woodcuts of three varieties which have been taken in England, one of which much resembles *V. ichnusa*.

THE CAMBERWELL BEAUTY. VANESSA ANTIOPA.

(*Plate XVII., Fig.* 1.)

Papilio antiopa, Linn., Syst. Nat. (x.), i., p. 476, no. 112 (1758); id. Faun. Suec. (ii.), p. 277, no. 1056 (1761); Esper, Schmett., i., pt. 1, pp. 163, 324, pl. 12, fig. 2, pl. 29, fig. 2 (1777).

Vanessa antiopa, Curtis, Brit. Ent., ii., pl. 96 (1825); Steph., Ill. Brit. Ent. Haust., i., p. 45 (1827); Kirby, Eur. Butterflies and Moths, p. 12, pl. 6, figs. 2, a–c (1878); Lang, Butterflies Eur., pp. 176, 363, pl. 41, fig. 2 (1882); Barrett, Lepid. Brit. Isl., i., p. 140, pl. 20, figs. 1, 1a, b (1892); Buckler,* Larvæ Brit. Butterflies and Moths, i., p. 52, pl. 8, fig. 4 (1886).

* Buckler received larvæ from Leipzig, and the yellow-bordered specimen now in his collection in the British Museum was almost certainly bred from one of these. It is accompanied by a preserved larva.

This has always been a very scarce Butterfly in England, and very uncertain in appearance. In some years a good many specimens are met with, and then, again, several years may elapse without more than one or two being seen. The old authors sometimes called it the "Grand Surprise," because about the year 1789 it appeared suddenly in unusual abundance. It was also called the Camberwell Beauty from having been first observed in England at that place in 1748. Curiously enough, it was unusually common in England exactly a century later, in 1848. All the English specimens are remarkable for their *white* borders,* whereas in the European specimens the border is almost always decidedly *yellow*. The Butterfly is also common in North America, but the American specimens are generally considerably larger, with the border of a more brownish-yellow than in the European ones. It frequents woods, avenues, gardens, and detached trees, and is an insect of powerful flight, but is very fond of settling on fallen fruit. Once, on the Continent, I was walking along a road which was bordered with bird-cherry trees, and strewn with the ripe fallen cherries. The fruit was very attractive to these Butterflies, which were flying backwards and forwards in numbers between the road and a small river, which ran nearly parallel to it at no great distance.

It used to be said that no British specimens were ever taken with yellow borders; but a few yellow-bordered ones have occasionally been met with of late years. In these cases it is reasonable to suppose that they were specimens which had either been introduced from the Continent, or reared from Continental larvæ and then set at liberty, in which case they would almost certainly fall a prey to the first prowling entomologist who happened to notice them.

* This form also occurs, though much more rarely, on the Continent; and Lang specially notes its occurrence, with specimens of other Butterflies closely resembling British examples, in Albania.

The Butterfly, which measures three inches across the wings, is of a deep purplish-chocolate colour, with the hind margins broadly white (or yellow in Continental and American specimens). Within this pale border runs a broad black band containing a row of large blue spots; and within the band there are two short white (or yellow) streaks on the costa of the fore-wings. The under surface is of a deep dead black, relieved only by the white border and the white marks on the costa of the fore-wings. The Butterfly appears in July and August, and hibernates, so that it may be found again in spring.

The larva, like the other species of the genus, is gregarious, feeding on willow, birch, and poplar in summer. It is black and very spiny, with a row of large red spots on the back, intersected by a black line, and the legs are red.

No other species is known which closely resembles *V. antiopa*, though its black under surface recalls that of *V. io*.

In Germany it is called "Trauermantel," and hence some of the American entomologists give it the name of the "Mourning Cloak."

Haworth in his "Lepidoptera Britannica," p. 28, remarks respecting the irregular appearance of *V. antiopa*, and of other Butterflies: "There is something very extraordinary in the periodical but irregular appearance of this species, as well as of *Papilio edusa* and *P. cardui*. They are plentiful all over the kingdom in some years; after which *P. antiopa* in particular will not be seen by anyone for eight or ten or more years, and then appear again as plentiful as before. To suppose they come from the Continent is an idle conjecture; because the English specimens are easily distinguished from all others by the superior whiteness of their borders. Perhaps their eggs, in this climate, like the seeds of some vegetables, may occasionally lie dormant for several seasons, and not hatch until some extraordinary but unforeseen circumstance awakes them into active life."

1. *Vanessa antiopa.*
2. " *io.*

Though very common in most parts of the Continent, there are many places in which the species is more or less uncertain in appearance, as it is in Britain.

THE PEACOCK BUTTERFLY. VANESSA IO.

(*Plate XVII., Fig.* 2.)

Papilio io, Linn., Syst. Nat. (x.), i., p. 472, no. 112 (1758); id. Faun. Suec. (ii.), p. 274, no. 1048 (1761); Esper, Schmett., i., pt. 1, p. 87, pl. 5, fig. 2 (1777).

Vanessa io, Steph., Ill. Brit. Ent. Haust., i., p. 44 (1827); Kirby, Eur. Butterflies and Moths, p. 12, pl. 6, figs. 3 a–c (1878); Lang, Butterflies Eur., p. 175, pl. 41, fig. 1 (1882); Barrett, Lepid. Brit. Isl., i., p. 136, pl. 19, figs. 2, 2, a–d (1892); Buckler, Larvæ Brit. Butterflies, i., p. 179, pl. 8, fig. 3 (1886).

The Peacock is one of the most beautiful of our British Butterflies, and as it feeds on nettles, is fairly common in lanes and open places in woods in most parts of the country, though much less abundant than the Small Tortoise-shell. It is found throughout Europe and Northern Asia as far as Japan; but does not extend very far south, as it is a much-prized rarity in Sicily, and is unknown in Southern Spain and on the north coast of Africa.

The Butterfly measures from two to three inches in expanse, and is of a dark red on the upper surface, with brown hind-margins. The fore-wings are marked with two central black costal blotches, separated by a small yellow spot, and the rest of the costal portion of the wing, between the outermost black blotch and the border, is varied with yellow, black, blue, red, and white, and below these markings are two white spots. The hind-wings have a large black crescent-shaped mark on the middle of the costa, and between this and the hind-margin is a yellowish-white ring, enclosing a very large black spot, in which

are several blue markings. The under surface of all the wings is of a deep dead black, as in *V. antiopa.* The Butterfly appears in summer and autumn, and hibernates, reappearing in spring.

The caterpillar, which feeds on the two common species of stinging nettle in summer, is black and very spiny. It is dotted with white, and the fore-legs are red.

This Butterfly has no resemblance to any other known species on the upper surface, but in the black under side it shows a certain affinity to *V. antiopa.*

GENUS PYRAMEIS.

Pyrameis, Hübner, Verz. bek. Schmett., p. 33 (1816); Doubl., Gen. Diurn. Lepid., p. 202 (1849); Schatz, Exot. Schmett., ii., p. 125 (1887).

Type, *P. atalanta* (Linn.).

Antennæ with the club short, and pointed at the end; palpi long, gradually narrowed to a point, and clothed with soft and short hair; wings regularly denticulated; fore-wings sometimes with a slight projection below the tip, the hind-margin below very slightly concave; inner margin nearly straight; hind-wings with the hind-margin rounded, and without projections. Larva spiny.

This genus is not numerous in species, but they have all a strong family likeness, and belong to two groups represented by our common British Butterflies, the Red Admiral and the Painted Lady. Both of these are insects of very wide distribution, but the other species of *Pyrameis* are found isolated in widely separated parts of the world, the largest and handsomest being from the Sandwich Islands and New Zealand.

Our species hibernate occasionally, but not habitually, and therefore are much less frequently met with in spring than in summer and autumn.

THE RED ADMIRAL. PYRAMEIS ATALANTA.

(*Plate XXIII., Figs.* 1, 2.)

Papilio atalanta, Linn., Syst. Nat. (x.), i., p. 478, no. 119 (1758); id. Faun. Suec. (ii.), p. 279, no. 1060 (1761); Esper, Schmett., i., pt. 1. (i.), p. 182, pl. 14, fig. 1 (1777).

Vanessa atalanta, Steph., Ill. Brit. Ent. Haust., i., p. 46 (1827); Kirby, Eur. Butterflies and Moths, p. 11, pl. 6, fig. 1 (1878); Lang, Eur. Butterflies, p. 177, pl. 41, fig. 3 (1882); Barrett, Lepid. Brit. Isl., i., p. 145, pl. 20, figs. 2, 2, a–d (1892); Buckler, Larvæ Brit. Lepid., i., pp. 49, 174, pl. 8, fig. 1 (1886).

The Red Admiral is a very common and conspicuous Butterfly, which appears rather late in the summer, or at the beginning of autumn, and may then be seen wherever there are flowers or fruit, of which it is very fond. It is found in gardens, or flying about trees in orchards, just as frequently as in lanes or clearings in woods, and it particularly affects ivy-blossom. It often flies in company with its congener, the Painted Lady, over waste ground, and both species are very fond of the slopes or summits of hills. It has a wide range over Europe, North Africa, Northern and Western Asia, and North and Central America; but in the Canaries another closely-allied species is met with, resembling *P. atalanta*, but with a broader and more irregular red band on the fore-wings. This is *P. vulcania* (Godart), an insect hardly distinguishable, except by its more intense red band, from *P. indica*, of Herbst, which inhabits North India, China, and Japan. How two forms, barely distinguishable as species, should have come to inhabit such widely-separated countries, between which they are scarcely likely to have been carried by accident, or even by design, remains one of the most perplexing of all the many difficult proverbs connected with the geographical distribution of Butterflies.

The Red Admiral measures from two to nearly three inches across the wings, which are of a velvety-black. The fore-wings have a slight projection on the hind-margin, below the tip, thus showing a closer affinity to the genus *Vanessa* than is presented by *P. cardui;* and this has led several authors to retain *P. atalanta* in the genus *Vanessa*, even when treating *P. cardui* as belonging to a distinct genus. The fore-wings have a broad red band running obliquely from the middle of the costa to the hinder angle, and between this and the tip are several white spots and a blue line. The hind-wings have a broad red border, containing a row of black spots, and a blue spot at the anal angle; the fringes of the wings are white, spotted with black.

The under surface of the fore-wings is similar to the upper, but paler, shading into grey at the tip, and there are several additional blue markings; the hind-wings are varied beneath with delicate shades of grey.

The larva is dull greenish-yellow, or blackish, with yellow spines, and an interrupted yellow line on the sides; the pro-legs are reddish. It is solitary, and feeds on nettle in early summer. It prefers the seed to the leaves, and usually protects itself from the weather by drawing a few leaves round it, which it secures by silken threads.

The pupa is brown, with golden spots.

THE PAINTED LADY. PYRAMEIS CARDUI.

Plate XVIII., Figs. 2, 3.)

Papilio cardui, Linn., Syst. Nat. (x.), i., p. 475, no. 107 (1758); id. Faun. Suec. (ii.), p. 276, no. 1054 (1761); Esper, Schmett., i., pt. 1, p. 133, pl. 10, fig. 3 (1777).

Cynthia cardui, Steph., Ill. Brit. Ent. Haust., i., p. 47 (1827); Buckler, Larvæ Brit. Butterflies and Moths, i., pp. 49, 174, pl. 8, fig. 1 (1886).

1. Vanessa urticæ

2.3. Pyrameis cardui

Vanessa cardui, Kirby, Eur. Butterflies and Moths, p. 13, pl. 7, figs. 3, a–d (1878); Lang, Butterflies Eur., p. 158, pl. 42, fig. 2 (1882); Barrett, Lepid. Brit. Isl., i., p. 149, pl. 21 (1892).

The Painted Lady was formerly considered to be an insect of rather irregular appearance in England, but it has apparently become more abundant of late years, for although it is commoner in some seasons than in others, it is now nearly always to be found in suitable localities, when looked for. It is, however, less frequently to be seen in gardens, &c., than *P. atalanta*, preferring waste ground, where it likes to settle on thistles, and

Variety of the Painted Lady (*Pyrameis cardui*).

other tall flowering plants. It is one of the most interesting Butterflies known, for it is literally almost cosmopolitan; and, with the exception of the Arctic Regions and South America, there is scarcely a country in the world where it may not be found. The Australian and New Zealand specimens, however, differ a little, and are sometimes called *P. kershawii* (McCoy), but are hardly to be considered truly distinct. A closely-allied species, *P. virginiensis* (Drury), or, as it is often termed, *P. huntera* (Fabr.), is found in North America; it is easily distinguished from *P. cardui* by the sub-marginal row of small

black eyes with blue pupils on the hind-wings. This species is found in Madeira and the Canaries, along with *P. vulcania* and *P. cardui;* but it scarcely admits of a doubt that it has been accidentally introduced from North America, as stray specimens of *P. virginiensis* have occasionally been taken in England too; and although it has hitherto only appeared in the British Islands singly, at long intervals, it is quite possible that if only a single brood happened to be reared in England, the species might become naturalised with us.

The Painted Lady measures two inches, or two and a half inches across the wings, which are black at the base, and otherwise of a tawny-orange, varying in intensity in different specimens (sometimes with a slight pink shade in extremely fresh ones), and streaked and spotted with black. The tip of the fore-wings is broadly black, and marked with several white spots, and the hind-margin is also black. On the hind-wings the hind-margin is spotted with black, and within it is an interrupted black line, followed by a row of round spots. There is also a blue spot at the anal angle. On the under surface, the fore-wings are pink, with the tip yellowish-grey, but otherwise nearly the same as on the upper surface. The hind-wings are yellowish-grey, marbled with different colours, and marked with a large white triangular spot in the centre. There is a bluish line, scarcely divided into spots, on the hind-margin; and within it are four black eyes in pale rings. The Butterfly appears in summer and autumn.

The larva is very spiny, of a brownish-grey colour, with interrupted yellow lines along the sides. It is solitary, and feeds on different species of thistle, also on nettle, mallow, artichoke, and several other plants.

The pupa is nearly of the same hue as the larva, but is thickly spotted with gold.

Like other species of the group, *P. cardui* sometimes ex-

hibits some very curious aberrations, one of which is figured on p. 99.

GENUS JUNONIA.

Junonia, Hübner, Verz. bek. Schmett., p. 34 (1816); Doubl., Gen. Diurn. Lepid., p. 206 (1849); Schatz, Exot. Schmett., ii., p. 125 (1887).

The genus *Junonia* and its allies are the tropical representatives of our *Vanessæ*, from which they differ by their naked eyes. But they can hardly be said to surpass our *Vanessæ* either in size or beauty, for though their colours are more sharply contrasted, the shading is not so soft, nor the colour so harmoniously arranged as in *V. io*, for example.

In *Junonia* the wings are more or less dentated, the fore-wings broad, triangular, not much longer than the hind-wings, and the hind-margin generally more or less concave. The hind-wings are regularly rounded, rather long, and often slightly produced at the anal angle, though not to anything like the same extent as in *Precis* (Hübner), in which the anal angle is often lengthened out into a short pointed tail.

The typical genus *Junonia* occurs in all the warmer parts of the Old World (Eastern and Southern Asia as far west as Asia Minor), and is also represented in various parts of North and South America; but the greater number of species are met with in the East Indies; and there are several species closely allied to the Indian ones in Africa. They are generally brown, banded or spotted with buff or tawny, and often with a large blue patch, or band, on the hind-wings. Two of the Indian species, *J. almana* (Linn.) and *J. asterie* (Linn.), are tawny, with at least one very large eye-spot on each wing; but, in many species, the eye-spots are rather small.

The larvæ are set with branching spines, as in *Vanessa*.

1. *Cynthia juliana.*
2. *Anartia amalthea.*
3. *Junonia orthosia.*

slight projection above the hinder angle; in some species, however, as in the bright blue *Precis rhadama* (Boisduval), from Madagascar, the hind-margin is hardly concave. The hind wings are denticulated, and the anal angle is generally produced into a point, and sometimes into a short tail, and there is frequently a more or less strongly pronounced angular projection in the middle of the hind-margin. These are Butterflies of moderate size, usually measuring about two inches or more across the wings, and are generally brown, with tawny bands, or with the tawny colour spread over most of the wing; while *P. amestris* (Drury) and its allies are blue, with a sub-marginal row of red spots. Sometimes there are one or more distinctly-marked eyes towards the anal angle of the hind-wings.

Their habits resemble those of *Vanessa.*

Salamis, Boisduval, is another African genus closely allied to *Precis*, but considerably larger, measuring three or four inches across the fore-wings, which are always sub-falcate below the tip, and then strongly concave; the hind-wings are strongly angulated or sub-caudate at or below the middle of the hind-margin. There are also conspicuous sub-marginal eyes on the under surface of the wings, represented above by brown spots, but the one at the anal angle is well marked on both sides of the wings. The most characteristic species of the group are those allied to *S. anacardii* (Linn.), several of which are common in Africa and Madagascar. They are white or pearly-white, often more or less suffused with a pinkish iridescence, and with more or less broad brown borders and brown sub-marginal spots. Other species are blue.

Indian and Austro-Malayan Regions.

Precis is represented by several species in these countries. They are generally brown, with darker transverse lines, and some of them are ornamented with a sub-marginal row of

red eyes. The wings, as a rule, are much less strongly anguiated than in many of the African species, and only slightly, if at all, produced at the anal angle of the hind-wings.

The genus *Pseudergolis* (Felder) differs from *Precis* in the very long club of the antennæ. The wings are dentated, with a slight projection on the hind-margin of the fore-wings above the middle. The commonest species, *P. veda* (Kollar), found in North India, measures about two inches across the wings, which are of a golden brown, with three black transverse lines, the outermost zig-zag, and between the two outer lines runs a row of black spots.

Rhinopalpa (Felder) much resembles the African genus *Salamis*, but the costa of the fore-wings is less strongly arched. The tip of the fore-wings is produced, there being a slight projection below it, under which the hind-margin is concave, but less deeply than in *Salamis*, nor does the hinder angle project so much. The hind-wings are rectangular or obtusely angulated, with a tooth or short tail at the angle. The colour, however, differs very much from that of *Salamis*. The species of *Rhinopalpa*, which measure two or three inches across the wings, are reddish or tawny, with brown borders, or they may be brown, with a broad orange band across both wings. Different species are found in Malacca, the Philippines, Java, Sumatra, New Guinea, &c.

Neotropical Region.

In addition to the American species of *Junonia*, the only other representative of this group is *Napeocles jucunda* (Hübner), a fine insect, four inches in expanse, with a very sharp projection on the hind-margin below the tip, under which is a deep concavity. The hind-wings are rounded and sinuated, with the anal angle projecting inwards in a large obtuse tooth, and the outer part of the inner margin is deeply concave. It is a

dark brown Butterfly, with a broad blue band running across the central part of the wings between the middle of the fore-wings and the middle of the hind-wings; there is also a blue spot towards the tip of the fore-wings. Bates remarks that it "is found only in swampy and thinned parts of the forest that clothe the delta-lands of the Amazons. . . . It prefers the humid cacao-groves on the islands, settling on fallen fruits; its flight is low, but exceedingly swift."

GENUS KALLIMA.

Kallima, Westwood, Gen. Diurn. Lepid., p. 224 (1850) Schatz, Exot. Schmett., ii., p. 128 (1887).

The species of *Kallima* are insects of considerable size. They are allied to the *Vanessæ*, with the wings very broad in proportion to their length, the fore-wings pointed, and sometimes slightly hooked, and the hind-margin first concave and then convex. The hind-wings are much produced at the anal angle, within which the inner margin is concave. The projection usually takes the form of a short, broad, and rather obtuse tail. The wings are usually either brown or blue above, with a broad orange-yellow, blue, or white band running obliquely from the middle of the costa of the fore-wings to below the middle of the hind-margin. On its inner side there are generally two transparent spots, but the under side of the wings is far more remarkable, for it is always of a more or less varied brown or grey, exactly resembling a withered leaf both in colour and markings, when the wings are closed. A darker line, corresponding to the mid-rib of the leaf, runs from the tip of the fore-wings to the tail on the hind-wings; and there are sometimes lateral lines as well. The species of *Kallima* inhabit India and the Malayan islands. One or two are found in Africa, but they differ a little from the types of the genus, as the fore-wings are less pointed, and the resemblance of the under side to a

withered leaf is much less remarkable. In the African species, also, the leaf-like pattern of the under surface is not always identical, and the same species often exhibits several forms of leaf pattern below.

THE INDIAN LEAF-BUTTERFLY. KALLIMA HUTTONI.

(*Plate XX., Fig.* 1.)

Kallima huttoni, Moore, Trans. Ent. Soc. Lond., 1879, p. 12; De Nicév., Butterflies Ind., ii., p. 263, note (1886).

There are several Indian species of *Kallima* much resembling the one figured by us. *K. huttoni* is a native of Northern India, and was originally described from Masuri. It measures three inches or rather more across the wings, which are of a rather dull blue at the base. The fore-wings are crossed by an oblique orange band, moderately broad, and running from the middle of the costa to above the hinder angle. On its inner side this is narrowly and not sharply bordered with black, and is rather irregular; one of the indentations contains a small oblong transparent spot. The outer portion of the wing beyond the band is black, with a white sub-apical spot; the apex of the wing is not very pointed; the blue of the hind-wings shades into broad brown borders on the inner and hind margins, and there is a zig-zag blackish sub-marginal line running down into the tail on the hind-wings, and slightly continued on the fore-wings near the hinder angle; the under side is brown, speckled with black, and with a blackish line edged outside with dark reddish-brown, running from the costa near the tip of the fore-wings to the end of the tail on the hind-wings. There are also three dark brown stripes running obliquely towards it from the basal half of the costa of the fore-wings, that nearest the base being the broadest, and continued across the upper part of the hind-wings. A sub-marginal zig-zag brown line runs across all the wings, turning inwards about

[illegible] leaf is much [illegible] remarkable. In the African species, [illegible] under surface is not always [illegible] exhibits several forms of [illegible]

[illegible] KALLIMA [illegible]UTTONI.

[illegible] 1.)

K[illegible] Ent. Soc. Lond., 1879, p. 12[illegible] [illegible] p. 2[illegible] note (1886).

Th[illegible] *Kallima* much resembling the [illegible] *K*[illegible]*uttoni* is a native of Northern India, and was originally described from Masuri. It measures three inches or rather more across the wings, which are of a rather dull blue at the base. The fore-wings are crossed by an oblique orange band, moderately broad, and running from the middle of the costa to above the hinder angle. On its inner side this is narrowly and not sharply bordered with black, [illegible]

1. 2. *Killima huttoni.*

3. *Neptis nicomedes*

4. *Thaleropis ionia*

the middle of the hind-wings, and running somewhat obliquely, and indented to the middle line. At about the point where the sub-marginal line is cut by the upper sub-costal nervure, another brown line runs obliquely to the central line, nearly parallel to the straight lower part of the sub-marginal line. Outside this inner line is a row of five very indistinct eyes with grey rings and small black pupils, the fifth, however, having a white pupil instead of a black one. On the fore-wings the oblique transparent spot stands just outside the central line, opposite the point where the first inner line adjoins it; this spot is surrounded by a pale yellowish iris, like those on the hind-wings, and there is a row of black spots above it, between the nervures, running obliquely outside the central line. The sub-apical vitreous spot is also, of course, visible on the under side.

This species is very similar to several others from North India, but may be known by its somewhat obtuse fore-wings, and the inconspicuous central vitreous spot. In some of the other species the tip of the fore-wings is long and pointed.

The specimens in the British Museum are from Masuri and Nepal.

EXOTIC GENERA ALLIED TO KALLIMA.

In addition to the African representatives of *Kallima*, we find the smallest species of this group, belonging to the genus *Coryphæola*, Butler, in Madagascar. The type of this genus, *C. eurodoce*, Westwood, much resembles a *Precis* in size and colour though not in shape; it measures about two inches across the wings, which are brown, with a fulvous band, marginal on the hind-wings, but sub-marginal and curving inwards to the costa on the fore-wings. The tip of the fore-wings is strongly falcate, and the anal angle of the hind-wings, which are rather long and not angulated, is produced into a tail, curving slightly outwards.

Indian and Austro-Malayan Regions.

The species of *Doleschallia*, Felder, measure three or four inches across the wings, but are, on an average, smaller than *Kallima*. The wings are narrower, the fore-wings being slightly produced at the apex, but not pointed or falcate, and the hind-margin is slightly and regularly concave. The hind-wings are rather long, with the hind-margin gradually curved, and are produced into a short obtuse tooth at the anal angle. They are reddish or tawny at the base, with more or less of the hind-margins, and the apical region of the fore-wings, black. They have no transparent spots, but generally well-marked eyes on the under surface; and the leaf-like colouring is not more pronounced than in many other genera of *Nymphalidæ*.

There are several species, the genus ranging from India to Australia.

GENUS ANARTIA.

Anartia, Hübner, Verz. bek. Schmett., p. 33 (1816); Doubl., Gen. Diurn. Lepid., p. 214 (1849); Schatz, Exot. Schmett., ii., p. 126 (1887).

This is a small genus of Tropical American Butterflies, resembling *Vanessa*, but belonging to the sub-group with naked eyes; and differing from all the allied genera in having the first branch of the sub-costal nervure more or less united with the costal. The wings are rather short and broad, with open wing-cells, and there is a short tail at the outer lower angle of the hind-wings. Only about four species are known, but they are very common insects; and Bates remarks: "The species have the habits and mode of flight of the *Vanessæ* and *Junoniæ*, and are found only in open, weedy, and bushy places, chiefly in the neighbourhood of towns."

The larvæ are clothed with long, soft, diverging hair on the

sides of each segment, and feed on Cassava, and other common American plants.

ANARTIA AMALTHEA.

Papilio amalthea, Linn., Syst. Nat. (x.), i., p. 478, no. 118 (1758); Clerck, Icones, pl. 40, fig. 3 (1764); Cramer, Pap. Exot., iii., pl. 209, A, B (1780).
Papilio amathea, Linn., Mus. Ludov. Ulr., p. 288 (1764).
Vanessa amathea, Godt., Enc. Méth., ix., p. 298, no. 4 (1819).
Anartia amalthea, Doubl., Gen. Diurn. Lepid., p. 216, pl. 24, fig. 5 (1847).

This pretty insect measures two inches or more across the wings, which are dark brown, with a broad red band, variable in width, running from below the costa of the fore-wings, where it is bifid, nearly to the anal angle of the hind-wings; on the latter it is intersected with a black line. Beyond this there are two rows of white spots on the fore-wings, and one on the hind-wings, and the fringes are also chequered with white. Towards the anal angle of the hind-wings are several red spots. The under side is yellowish-brown towards the base, and brown towards the margins, the white spots being distinct, but the red markings more or less obsolete. The body is dull black above, and the club of the antennæ is tipped with reddish.

The Butterfly is very common throughout Southern and Central America. The other species resemble *A. amalthea* in shape, but are brown, with white transverse bands, and tawny markings; or white, with brown and tawny markings; always with an ocellated spot towards the hinder angle of the wings.

THE GENUS ERGOLIS AND ITS ALLIES.

After *Anartia* we may place three genera belonging to the *Vanessa* group, which were formerly included with *Elymnias*

and some few other genera in a heterogeneous family called *Eurytelidæ*, which is now abolished. The species are of rather small size for *Nymphalidæ*, measuring only about an inch and a half, or two inches at most, across the wings, and are confined to Africa and the East Indies. The genus *Eurytela* (Boisduval) has rather short, broad, denticulated wings, and the fore-wings have usually a slight projection on the hind-margin a little below the tip, and a slighter one above the hinder angle, and between these the middle of the hind-margin is slightly and regularly concave. The hind-wings are also emarginate in the black and white *E. fulgurata* (Bd.), from Madagascar. They vary considerably in colour; the commonest African species are *E. dryope* (Cramer), and *E. hiarbas* (Drury). These are brown Butterflies, with a conspicuous sub-marginal band, orange-tawny in the former, and white in the latter species, this band being broadest towards the anal angle of the hind-wings, and tapering gradually towards the costa of the fore-wings, which it does not reach. They are described by Mr. Trimen as sporting around bushes. One of the Eastern species, *E. castelnaui*, Felder, from Malacca, Borneo, &c., is of a beautiful blue on the upper side of the wings.

The genus *Ergolis*, Boisduval, has broader and less dentated hind-wings, though the hind-margin of the fore-wings is always concave in the middle. The East Indian species are generally brown above, with dark transverse zig-zag lines, and the under side is brown or brownish-red, with dark transverse lines. The dilated costal nervure will distinguish this genus from *Pseudergolis*, which it much resembles. Except in colour, it also much resembles *Eurytela*, and the larvæ of both are spiny, with bifid spines on the head. The species of *Ergolis* frequent open bushy places. The African species are brown, often more or less suffused and banded with blue.

Hypanis, Boisduval, the third genus of this little group, is found, like the two preceding genera, both in Africa and India,

but differs from them in the nearly entire margins of the wings, which are fulvous, with black markings toward the base, costa, and hind-margins; the under surface of the hind-wings is buff, with black spots or white lines. Mr. Trimen describes the South African species as frequenting grassy and bushy places on the borders of woods, flying low, and not rapidly, and often settling on the ground or on the herbage.

GENERA ALLIED TO EUNICA.

The Butterflies of this section stand between the *Vanessæ* and *Catagrammæ*, and are of moderate size, and usually of splendid colours.

With the exception of the genus *Crenis*, Boisduval, which is African, they are all confined to Tropical America. Most of them are black or brown Butterflies, measuring two or three inches across the wings, and splendidly adorned with blue, green, yellow, white, or orange. Red, so usual a colour in *Catagramma* and its allies, is rather uncommon in the present group, and, where it does occur, it is generally confined to the base of the under side of the fore-wings. Sometimes the latter are more or less produced at the tip, with the hind-margin slightly concave beneath, and the hind-wings are rounded and often slightly denticulated, but never tailed. They are insects of strong flight, the males frequenting sunny places, or the banks of streams, while the females, which are often very dissimilar, and frequently much duller in colouring, conceal themselves in the forest, and are much more rarely seen. Some are so unlike the males as to have been placed in different genera, before their relationship was discovered. The larvæ have long branching spines on the head, in addition to the shorter spines on the body.

The genus *Eunica*, Hübner, is the most extensive of this group, and is numerously represented in all parts of Tropical America

The species are black or brown, and measure about two inches in expanse, and the males are adorned with rich blue or purple, differently arranged in various species, sometimes spreading over a great part of both wings from the base, sometimes confined to the fore-wings, sometimes forming a sub-marginal band, and sometimes forming a sub-costal band on the fore-wings. One species, however, *E. margarita* (Godart), is nearly white, but some are brown in both sexes. The females are generally brown, with white markings on the fore-wings. The latter in this genus are generally not much longer than the hind-wings, and are not excavated, though sometimes slightly produced on the hind-margin below the tip. The under side of the hind-wings is generally light brown, with two transverse black lines, and a series of ocellated spots within them, consisting of a black pupil, sometimes centred with white, and an outer black ring, separated from the pupil by a space concolorous with the ground-colour.

Libythina, Felder, contains only one species, *L. cuvieri* (Godart), found on the Lower Amazons, and in the West Indies. It is brown, with the outer part of the fore-wings black, spotted with bluish-white, and measures an inch and a half across the wings. It may be known from any other Butterfly of this group by its very long palpi, and its long hind-wings, which are slightly pointed, the hind margin and inner margin converging in a somewhat unusual manner. Bates describes it as not being a forest insect, but as frequenting swampy meadows, where both sexes fly slowly about low bushes.

Closely allied to *Eunica* is the one African, indeed, the only Old World genus of this group, *Crenis*, of Boisduval. The South African species are brown, with tawny markings; the fore-wings are considerably produced at the tips, and the hind-wings have a sub-marginal row of eyes on the under surface, sometimes indicated above. The species found in Madagascar is similarly coloured.

Those met with on both coasts of Tropical Africa are larger and broader-winged insects, generally exceeding two inches in expanse, and with the fore-wings hardly produced at the tips. They are adorned with very delicate tints of mauve or light blue; the fore-wings are orange beneath, and the hind-wings are banded or spotted with blue and orange in varying proportions.

Mr. Trimen describes the South African species as flying about trees, and settling on the trunks and branches; the pupa has a bifid head.

The handsomest South American genera of this group of *Nymphalinæ* are *Epiphile* and *Myscelia* of Doubleday, and *Catonephele* of Hübner. In all these the hind-margin of the fore-wings is frequently more or less concave below the tip.

The species of *Epiphile* measure two inches or a little more in expanse, and there is usually a slight tooth on the hind-margin of the fore-wings below the tip. The wings are black, sometimes suffused with blue or purple, and broadly banded with orange across both wings. There is a second band on the fore-wings, present even when the inner band is absent, owing to the prevailing colour of the wings being blue or brown; and this is sometimes yellowish, or even white. Towards the tip of the fore-wings is a conspicuous white spot. On the under surface the fore-wings resemble the upper side; the hind-wings are usually of a purplish-brown, with a submarginal row of eyes, which, though well-defined, is nearly obliterated by the ground-colour, and there is a whitish mark on the middle of the costa.

The typical species of *Myscelia* resemble *Epiphile* in size and shape; but there is a tendency to angulation in the hind-wings of several species. The commonest of these is the Brazilian *M. orsis* (Drury), which is of a brilliant blue with white spots in the male. It measures about two inches across the

wings; the female is larger, and is brown, with a white stripe in the cell of the fore-wings, white spots on the fore-wings and white lines on the hind-wings, arranged in a similar way to that seen in so many Eastern Butterflies of the *Limenitis* group, especially in the genera *Neptis* and *Athyma*.

The genus *Catonephele*, Hübner, includes the largest and handsomest Tropical American species of this group, and those in which the sexes are most dissimilar. The males are black in the first section, with a broad orange band across both wings, which is sometimes interrupted near the tip of the fore-wings, or replaced by two large orange spots. The females are black, with yellow markings, arranged as in *Neptis* or *Athyma*, or are black, banded with yellow on the fore-wings, and with either a large orange blotch, with black markings, on the hind-wings, or with some bluish sub-marginal lines. The second section is black, with an oblique greenish-blue band on the fore-wings, and a sub-marginal band on the hind-wings, or the hind-wings in the male are orange at the base, or banded with orange; the wings being green beneath in both sexes. The species of *Catonephele* measure three inches across the wings; and the fore-wings, which are nearly entire in the males, are produced at the tip in the females, with the hind-margin concave. Bates writes: "They are forest Butterflies, the males being seen sporting in the gleams of sunlight which penetrate the dense shades, and the females wandering among the lower trees. I bred one species of this genus, *C. acontius*, of Linnæus. The larva is light green, with steel-blue head, and is armed with branched spines, two of which on the head are of great length and verticillate; the pupa is light green, varied with pink, and has the back of the thorax deeply excavated, and irregular in outline."

The male of *Catonephele obrina* (Linn.) is a black, blue-green, and orange Butterfly, with a green under surface. It

was one of the first insects which attracted the special attention of Wallace and Bates near Pará, and Dr. Wallace records his subsequent disappointment when, on laying down his collecting-box for a few moments in the verandah of the house where they were staying, he found it already full of ants, and several of his specimens destroyed.

Some of the smaller species of this group are fulvous or yellowish-fulvous above, with black tips to the fore-wings; one, *Peria lamis* (Cramer), which does not measure more than an inch and a quarter across the wings, is brown above, and dull yellow, with transverse black lines and intermediate spots, below. It is widely distributed in the north of South America.

GENUS CATAGRAMMA.

Catagramma, Boisduval, Spéc. Gén. Lépid., i., pl. 9, fig. 2 (1836); Doubl., Gen. Diurn. Lepid., p. 243 (1850); Schatz, Exot. Schmett., ii., p. 147 (1888).

Type, *Catagramma pygas* (Godart).

There are a great number of middle-sized or rather small *Nymphalinæ* in Tropical America, distinguished by the absence of spines on the first joint of the tarsi in the female, and by the spiny larvæ. Many of these are adorned with the most beautiful colours and patterns, and among them the genus *Catagramma* and its immediate allies hold a conspicuous place.

Most of these species are of a velvety-black, with blue, green, crimson, or ochreous bands and markings on the upper surface; but three of the more important genera can be readily distinguished by the markings of the under surface alone. Thus, *Callicore*, Hübner, is black above, generally with a blue or green band across the fore-wings, and a border of the same colour to the hind-wings. The under surface of the fore-wings is red, with

a broad black border, crossed by grey stripes, or the apex is greyish. The hind-wings are of a light grey, with more or less broad and complete black rings running all round, unless partially interrupted on the costa. Within these are two smaller rings, each enclosing two black dots or spots. The English in Brazil call these Butterflies "Eighty-eights," on account of the similarity of the central markings to the figures 88. They measure about an inch and a half across the wings. The species of *Perisama*, Doubleday, are rather larger, and are similarly marked above, but usually have brassy green or blue radiating markings at the base of the fore-wings in addition. On the under surface, the fore-wings are sometimes marked as in *Callicore*, but are frequently more or less black, with blue markings, or are yellow at the base and tip. The hind-wings are grey, brown, or yellow, with two parallel lines, and a row of small black spots between. In *Catagramma* the upper side is usually marked with large bands or masses of red, variously arranged in different species, and also occurring in the females. The red markings are often replaced by orange, or by an intermediate shade. Many of the species are coloured as in *C. astarte* (Cramer) which we have figured; others are marked with two very large eyes on the under surface of the hind-wings, or with yellow stripes on a black ground, which sometimes cover nearly the whole of the wing, or are intersected by a row of bluish spots. In fact, the species of *Catagramma* are nearly always more or less adorned with blue spots beneath. They have a rather lofty flight, and are fond of settling on the trunks of trees. *Callicore* is described as having a rather slow, sailing flight, but it shares with some species of *Catagramma* the habit of settling on filth, or at the edges of pools.

THE COMMON SOLDIER-BUTTERFLY. CATAGRAMMA PYGAS.

Nymphalis pygas, Godart, Enc. Méth., ix., p. 423, no. 232 (1823).

Catagramma pygas, Blanchard, Voy. Pole Sud, Ins., p. 222, no. 786, pl. 32, figs. 6, 7 (1844); Herrich Schäff., Ausser-europ. Schmett., pl. 9, figs. 15–18 (1853).

Catagramma hydaspes, Boisd (nec Drury), Spéc. Gén. Lép., i., pl. 9, fig. 2 (1836).

A brown Butterfly, flushed with blue in the male, and with the base of the fore-wings red below the costa to the end of the cell, or beyond, and above the inner margin nearly to the hind margin. There is a short macular oblique whitish or yellowish stripe across the tip of the fore-wing, and a pale blue sub-marginal stripe towards the anal angle of the hind-wings. On the under surface of the hind-wings there is a row of long blue dashes beyond the inner rings; of the latter, the uppermost contains four bluish-white spots, and the lower, two.

This species, which is the type of the genus *Catagramma*, measures about two inches across the wings, and is common in Brazil.

THE BANDED SOLDIER-BUTTERFLY. CATAGRAMMA ASTARTE.

(*Plate XXI., Figs.* 1, 2.)

Papilio astarte, Cram., Pap. Exot., iii., pl. 256, figs. C. D. (1779).

Catagramma sinamara, Hewitson, Exot. Butterflies, i., *Cat.*, pl. 3, figs. 20, 21 (1884 : ? ♀).

The male of this species measures about two inches and a quarter across the wings, which are black above, with crimson markings; the hind-margins are marked with white between the nervures. The fore-wings are crimson from the base nearly to the middle, except narrowly along the costa; and this colour is continued from the base of the hind-wings as a broad band, rounded at the end, nearly to the hind-margin. On

the fore-wings a crimson band runs somewhat obliquely from beyond the middle of the costa to above the anal angle, and before the tip is a third short crimson dash. On the hind-wings there are two small white dots near the anal angle. The under surface of the fore-wings resembles the upper, but there is a short ochreous streak at the base of the costa, the red band is slightly ochraceous at the extremities, and the sub-apical crimson spot is replaced by a short ochreous line, followed by a blue one. The hind-wings are black, with an ochreous line just beyond the base, curving round close to the inner-margin for three-fourths of its length. Beyond this is a large oval ochreous figure, starting from the costa, where it is slightly incomplete and edged by a black line, filling the greater part of the middle of the wing; within it are three blue spots, arranged in a triangle, the uppermost being linear in shape, the lower ones rounded; a short ochreous dash separates the upper one from the others. Beyond the oval figure is a curved row of eight blue spots, the upper ones linear, the lower ones rounded, extending from the costa to the inner margin; and beyond these there is a sub-marginal ochreous curved line.

The body appears to be black, with a red collar; the orbits are white, and the legs are spotted with black and white. We believe *C. sinamara* of Hewitson to be the female. It is orange-tawny over the greater part of the fore-wings, except towards the apical region, and has a short yellow stripe near the tip; and the hind-wings are tinged with the same colour at the base.

If *C. sinamara* turns out to be a distinct species, the female of *C. astarte* will certainly be found to resemble it. The Butterfly described and figured by Hewitson as the female of *C. astarte* in the "Transactions of the Entomological Society of London" (2), vol. 1, p. 100, pl. 11, p. 3, is the true female of

1. 2. *Catagramma astarte.*
3. 4. *Hæmatera pyramus.*

C. cynosura (Doubleday and Hewitson), a species quite distinct from *C. astarte*. The latter has frequently been mistaken for *C. codomannus* (Fabricius), the type of which (a male) is in the Banksian collection in the British Museum, and is from Brazil. It is flushed with rich purple, as in *C. texa*, Hewitson—a species differing much from it in pattern—and the red at the base of the hind-wings does not extend below the median nervure. The inner-margin is damaged; but the specimen is otherwise identical with *C. miles*, Bates, in which the yellow sub-marginal line ceases before the anal angle, and the penultimate blue spot throws a spur outwards. In addition, the upper blue streak is separated, not by a short yellow dash, but by a nearly continuous stripe.

Of *C. miles*, Bates writes: "This species closely resembles *C. astarte* in the colours of the under surface, the inner part of the black band left between the two yellow circles touching the costa, as in *C. astarte*. It entirely replaces *C. astarte* on the Upper Amazon, and is an abundant insect, especially near St. Paulo,* where every day in the showery season numbers are seen even in the village, enlivening with their bright crimson liveries the dull, muddy streets."

Cramer described this species from Surinam, and I am not quite certain that the specimens which stand in different collections from various parts of South America under the names of *C. astarte* and *C. codomannus*, and which vary considerably among themselves, really belong to the former species. They do not possess the two white dots on the upper side of the fore-wings, and the pattern of the under side differs a little, especially towards the anal angle, and the bands are yellow instead of ochreous. Of course these differences may be due to incorrect drawing or colouring; but I have found that

* This town, on the Upper Amazons, must not be confounded with the province of the same name in South Brazil.

in many cases where such inaccuracies are suspected, the suspicion has only been occasioned by attempting to fit a description or figure to an allied form from a different locality, and that, when one gets the right insect from the true locality, the author and draughtsman proved to have been more accurate than was supposed. By applying this rule I have often been able to re-establish disputed species, the identity of which had been considered insoluble, and I am therefore inclined to believe that when an author condemns a description or figure as inaccurate, the fault is at least as likely to rest with the critic, as with the original describer or artist, though I once met with extraordinary discrepancies in figures made from the *same* specimen by different artists.

GENUS HÆMATERA.

Hæmatera, Doubl., Gen. Diurn. Lepid., p. 231 (1849); Schatz, Exot. Schmett., ii., p. 149 (1887).

This is a small genus, containing only two South American species, much resembling *Catagramma*, but with rather shorter fore-wings and more slender antennæ. The hind-wings are mottled beneath, without the sharply-defined markings which are so conspicuous in *Catagramma*.

HÆMATERA PYRAMUS.

Papilio pyramus, Fabr., Spec. Ins., ii., p. 130, no. 590 (1781); Drury, Ill. Exot. Ent., iii., pl. 23, figs. 3, 4 (1782); Stoll, Suppl. Cram., pl. 32, figs. C. C. A. (1790).

Hæmatera pyramus, Staud., Exot. Schmett., i., p. 122, pl. 43 (1886).

(*Plate XXI., Figs.* 3, 4.)

This prettily-coloured Butterfly measures about an inch and three-quarters between the tips of the wings, or rather less. It is blue-black above, with a broad curved scarlet band, which extends to about the middle of the hind-wings. On the under

surface the fore-wings are red at the base, the apical half being brown, with grey markings. The hind-wings are irregularly mottled with grey and brown, and there is a row of bluish spots parallel to the hind-margins, which are yellowish, bordered with black and blue contiguous lines. This Butterfly is found in various parts of South America, as is also the type of the genus, *H. thysbe* (Doubleday and Hewitson), which is smaller, with the red colouring of the fore-wings extending to the base.

In the neighbourhood of *Catagramma* and its allies is to be placed another very beautiful genus of South American Butterflies, *Callithea* (Boisd.). The species are generally considerably larger than those of *Catagramma*, measuring two inches and upwards in expanse, but they may usually be distinguished from them at a glance by the pattern and colouring of the wings beneath. The type of the genus is *C. sapphira* (Boisd.), in which the male is of the richest blue, with a broad velvety-black band running from the middle of the fore-wings to the inner-margin of the hind-wings; the under side is bluish-green, with the inner-margin of the fore-wings black, and the hind-wings orange at the base, and with three rows of black spots parallel to the hind-margin. The female is black, with the base of the wings blue, the fore-wings with a broad oblique band of pale orange from the middle of the costa to the hinder angle, and the hind-wings with a dull green sub-marginal band on the lower half. Bates found this species abundantly in the dry woods near Santarem, sometimes even entering the town. The larva is armed with branching spines, two on the head being much longer than the rest.

Other species of the genus are equally beautiful. They may be black, with or without purple at the base, and a marginal or sub-marginal band of blue or green on all the wings. Other species are blue or purple, with the basal half of at least the

fore-wings generally orange or red; in these the base of the wings is generally broadly orange or red. Different species are found throughout the northern half of South America, where they seem to be local, but gregarious, and generally abundant in their own localities. They may always be known by the sub-marginal black spots on as much of the outer half of the under side of the hind-wings as the basal colouring leaves green. It is true that one or two species of *Agrias* are similarly coloured beneath, but these are much larger and more robust Butterflies, with dentated hind-wings, whereas the hind-margins of *Callithea* are entire.

THE GENUS GYNÆCIA AND ITS ALLIES.

This is a little group of Butterflies peculiar to Tropical America, with broad, short wings; the hind-margin of the fore-wings almost entire, and the hind-wings generally slightly dentated, and produced at the anal angle.

Callizona aceste (Linn.) is a tawny species, with more than the apical half of the fore-wings black, crossed by an oblique tawny band, and with white spots before the tip, the tip of the hind-wings being likewise black. The under side of the hind-wings is grey, with black stripes running obliquely outwards from the costa, and others running inwards to the inner margin. In this genus, the hind-wings, though forming a rather long oval, are not denticulated or produced. *C. aceste* is a common South American insect, and is in the habit of settling on tree trunks, with its wings held perpendicularly. The larva is spiny, with short spines in the head, and the pupa has long appendages on the head, as in *Ageronia*.

A still commoner insect throughout all Tropical America is *Gynæcia dirce* (Linn.), which greatly resembles *Callizona aceste* in its habits and transformations, but has shorter appendages on the head of the pupa. It is a larger Butterfly, gener-

ally expanding over two inches, and the wings are brown; the fore-wings having an oblique sulphur-yellow band running from near the base to just above the hinder angle. The hind-wings are sub-dentated, with a short truncated projection at the anal angle. On the under surface the band is white, and all the wings are more or less obliquely striped with intersecting grey and black lines, which are tinged with yellow towards the hind-margins.

Next to this genus Schatz and Röber place *Smyrna*, Hübner, which includes one or two Butterflies from Mexico and Brazil, which were formerly placed near *Agrias*, Doubl., but the discovery of the larva proves that their true affinities are with *Gynæcia*. They are much larger insects, measuring over three inches across the wings, which are marked above nearly as in *Callizona aceste*, but are of a deeper fulvous. The hind-wings are dentated, and are slightly excavated on the lower part of the hind-margin, and then produced at the anal angle into two short obtuse prominences, with a slight depression between them. The under side of the hind-wings is brown, covered with a number of bluish-grey curving and undulating lines; towards the centre runs a straight broad whitish band, with irregular edges, and towards the hind-margin is a row of variously-coloured eyes in several concentric rings.

THE GENUS HYPOLIMNAS AND ITS ALLIES.

Hypolimnas, Hübner, or *Diadema*, Boisduval, as it was formerly called, is the typical genus of one of the most remarkable sections of mimicking species in the *Nymphalinæ*. The Butterflies of this genus are large insects, generally expanding three or four inches across the wings, which are rather broad. The fore-wings are not much produced, and the hind-margin is generally slightly concave. The hind-wings are rounded, or more frequently rather long, and more or less dentated,

rarely sub caudate or concave. The species are all tropical or sub-tropical, and are most abundant in the Indian and Austro-Malayan Regions, though the first two genera we have to notice are peculiar to Tropical America, and are distinguished from the others by the strongly dentated hind-wings, with a short tail in the middle of the hind-margin.

Victorina steneles (Linn.) is remarkable for its superficial resemblance in colour to *Metamorpha dido* of Linnæus, though the green is more broken into blotches on the fore-wings, and the cell is not filled up with green. The shorter fore-wings, strongly dentated hind-wings, and the black and tawny markings between the green blotches on the under side will readily distinguish it. Like *M. dido*, it is common throughout Tropical America, and Bates writes: "It frequents open sunny places, such as deserted plantations and the borders of woods."

The species of *Amphirene*, Doubleday, differ from *Victorina* in their shorter and broader wings, and still more in their colour. They are brown, with a white band across the wings, which is oblique on the fore-wings and sub-marginal on the hind-wings; in *V. superba*, Bates, from Guatemala, the band is edged with blue; and in *V. epaphus* (Latr.), the type of the genus, the apical region of the fore-wings is tawny. The smallest species of the genus, *V. sulpitia* (Cramer), found in Guiana, is brown, with a broad transverse white band, interrupted below the costa of the fore-wings; it resembles a species of *Adelpha*, Hübner, or *Pyrrhagyra*, Hübner, in appearance, in the neighbourhood of which *Victorina* (which also formerly included *Amphirene*) has been placed by some writers. This species only measures about two inches and a half across the wings; the other species of the group measure nearly four inches in expanse.

The species of *Hypolimnas*, Hübner, are most numerous in

the Indian and Austro-Malayan Regions. They are generally black, with blue and white markings; and the females are more or less tawny. One of the commonest species is *H. misippus* (Linn.), in which the male is black, with a white oblique band on the fore-wings, a smaller one at the tip, and a broader band or blotch on the centre of the hind-wings, all bordered on both sides with rich violet-blue. The under side of the fore-wings is paler brown, with a broad white transverse band, having a brown notch in the middle of the costal end. The female is, at first sight, almost indistinguishable from *Limnas chrysippus* (Linn.), but has a large black spot on the costa of the hind-wings, and no spots in the centre, where the discoidal cell is also quite open. It varies, moreover, in the same way as *L. chrysippus*. It is common in Tropical Asia and Africa, and has been introduced into the north of South America. In India and the Indian Archipelago there are a great number of closely-allied species, which used to be considered local varieties of *H. bolina* (Linn.). The males are very similar to those of *H. misippus*, but the blue and white spots are smaller, and the white band of the under surface is narrower, duller, and not indented on the costa. The females, however, vary very much; they are larger than the males, and sometimes resemble them, except in having a sub-marginal row of white dots; they are sometimes spotted and banded with white, with a large tawny blotch on the costa of the fore-wings, but sometimes they are entirely brown, with a sub-marginal row of white dots, and a few blue spots towards the costa of the fore-wings.

Among the other Eastern species are some which much resemble *Euplæa* in colouring. Others belong to a group found in the Moluccas, &c., of which the largest and best known is *H. pandarus* (Linn.). This often measures nearly five inches across the wings, which are black, with a violet-blue

blotch on the hind-wings in the male, and connected sub-marginal orange markings. The female has two converging rows of large white spots on the fore-wings, and a broad sub-marginal orange band on the hind-wings, containing a row of oval black eyes, ocellated with pale blue. This band is represented on the under side of the hind-wing in both sexes, and the blue pupils of the eyes are much larger.

H. salmacis (Drury) is a common African Butterfly, four inches in expanse, and broadly banded with blue and white on a black ground.

The African genus *Euralia*, Westwood, has rather longer and narrower fore-wings than typical *Hypolimnas*. The species are black-bordered, with white hind-wings, a white sub-apical band on the fore-wings, and a broader oblique one nearer the base, or a white space on the inner-margin. They mimic various species of the genus *Amauris* in the *Danainæ*.

Pseudacræa, Westwood, is another African genus, which is usually placed in the neighbourhood of *Hypolimnas*, though Schatz and Röber consider it more nearly allied to *Limenitis* in its neuration. The species are black, with red spots and markings, or black and white, and closely resemble the larger species of *Gnesia* and *Planema* in colour. Some of the smaller species, however, which are found both in Africa and Madagascar, measure about two inches across, have shorter wings, green or white towards the base, and have but little resemblance to *Acræinæ*.

There are several peculiar East Indian genera of rather small extent, which are almost confined to the Asiatic continent, and are most numerous in Northern India. One of these is *Hestina* (Moore), the type of which, *H. assimilis* (Linn.), is a common insect in India and China. It is about three inches in expanse, and is of a dark brown, with buff streaks and spots arranged in transverse lines on the fore-

wings, and having streaks which radiate from the base between the nervures of the hind-wings, in the same way as in *Tirumala*, and other genera of green *Danainæ*. The lower part of the hind-margin is broadly black, and marked with a row of large red spots. The hind-margin of the fore-wings is slightly concave, and that of the hind-wings is dentated and very slightly angulated in the middle.

Calinaga, Moore, is a genus which was formerly regarded as allied to *Parnassius*, but is now placed near *Hypolimnas* It is brown, with broad dull white stripes radiating from the base, beyond which are larger spots, and then one or two irregular rows of spots between these and the hind-margin; the thorax is red, and the antennæ unusually short. The wings are almost entire. The insect measures about three inches in expanse, and is of a very peculiar form, the costa of the fore-wings being long, but the hind-margin is so oblique that the hind-wings, which are very long, and slightly angulated in the middle of the hind-margin, project far beyond the hinder angle of the fore-wings. The few known species are found in Northern India at a considerable elevation.

Another curious genus is *Euripus*, Doubl., the type of which, *E. halitherses*, Doubl. and Hew., is a common North Indian species, about two inches in expanse. It is black, with the base spotted with white on the fore-wings, and streaked with white on the hind-wings, having also two rows of white sub-marginal spots. The hind-margin of the fore-wings is slightly concave below the middle, and the hind-wings are slightly angulated, with a deep concavity between the tooth at the angle, and the rather projecting anal angle. The female, which differs so much from the male that it was originally described by Mr. Moore as generically distinct, under the name of *Hestina isa*, is larger, and has longer and more rounded wings. It is brown, with a broad oblique white

bar on the fore-wings, and a sub-marginal row of spots; on the hind-wings there are two rows of sub-marginal spots, and long white streaks radiating from the base between the nervures. This insect greatly resembles the female of *Danisepa rhadamanthus* (Fabr.), which belongs to one of the genera allied to *Euplœa.*

Several very handsome species which are now generally referred to *Euripus* are met with in Japan; but they are very unlike the small *E. halitherses* which we have just described. The hind-margins of the fore-wings are only slightly and regularly concave, and the hind-wings are broad, regularly curved, and dentated, but not angulated or emarginate. Among these is *E. charonda* of Hewitson, one of the largest and most beautiful Butterflies found in Japan, measuring from four and a half to six inches across the wings. The female, which is considerably larger than the male, is dark brown, with large ochreous spots, which become white towards the base; from the middle of the base of the fore-wings runs a slender white line. There is a sub-marginal row of ochreous spots round all the wings, largest on the hind ones. On the fore-wings there are three oblique bands of larger spots, the first consisting of a dumb-bell-shaped spot in the cell, with two larger ones below; the second runs from before the middle of the costa to the lower sub-marginal spots, and the outermost meets the sub-marginal spots at a third of their length. The hind-wings have three rows of spots, the second rather irregular above, the innermost composed of very large spots below, and very small ones above. The male is similar, but is rich blue on all the wings, from the base to the second row of spots; all the spots on the blue ground are white, and there is a large red spot at the anal angle of the hind-wings.

This splendid insect flies very high, and it is difficult to obtain good specimens of it. It is most easily taken when

sucking the sap of trees, exuding from the burrows formed by the larvæ of large Moths belonging to the families *Zeuzeridæ* and *Hepialidæ*.

Herona marathus, of Doubleday and Hewitson, is another North Indian species of this group, with the hind-margins dentated, and a slight concavity in the middle of each. It is brown, with a tawny band running from the base of the fore-wings below the cell, and three, partly macular, bands from the costa. The hind-wings have two broad tawny bands, converging at the ends, running from the inner-margin, and a sub-marginal tawny line towards the anal angle. Most of the Butterflies of this group resemble those of other dominant genera, and *H. marathus* is very like some species of *Athyma*, Westw., or *Abrota*, Moore, genera belonging to the *Limenitis* group, as regards, colour and pattern.

Among the largest of the North Indian species allied to *Diadema* is *Penthema lisarda* (Doubleday), which measures between five and six inches across the wings. It is black, with broad buff radiating stripes between the nervures on the disc, and with large sub-marginal spots beyond. In the cell of the fore-wings are two or three long spots and stripes; the hind-wings having broad buff stripes at the base in and below the cell. On the under surface the wings are strongly tinged with rust-colour, except on the disc of the fore-wings. The hind-wings are dentated, and rather long.

Another curious species is the Chinese *Isodema adelma* (Felder). It is of a dull black; on the fore-wings a row of large white spots runs from near the base to the hinder angle; another short row from the costa, just before the middle; and there are two rows of small sub-marginal spots. On the hind-wings is a single row of white sub-marginal spots, diminishing in size from the tip to the anal angle. The wings expand about three and a half inches, the fore-wings are short and broad,

and the hind-wings form a long oval, and are regularly curved and dentated.

Among other North Indian Butterflies allied to *Hypolimnas*, but with the costa of the fore-wings straighter, and the hind-wings rounded and but slightly dentated, we may mention *Stibochiona*, Butler. The Butterflies of this genus measure three inches across the wings, with some rows of blue and white sub-marginal spots. *Neurosigma siva*, of Westwood, is a pale tawny Butterfly, expanding four inches, with large black spots towards the base, and zig-zag lines beyond, while the hind-margins of the fore-wings are broadly black, with two rows of pale yellow spots.

Mynes, of Boisduval, a small genus confined to Australia, New Guinea, Ceram, &c., is placed near *Hypolimnas*, by Schatz and Röber, though it was formerly considered to be more nearly allied to *Charaxes* (Ochs.). These Butterflies expand two inches or more across the wings; the fore-wings are short and broad, and the hind-wings are rounded above, but almost rectangular below, with a projecting tooth at the outer angle, the space between this and the inner angle being dentated. The upper side is of a greenish-white with black borders, varying in width, and sometimes reducing the pale basal colouring to very small dimensions. The under surface varies in a similar way, but is nearly always adorned with red spots at the base and in different parts of the wings, and there are often yellow or bluish-green markings in addition, to relieve the plain black and white.

GENUS AGERONIA.

Ageronia, Hübner, Verz. bek. Schmett., p. 41 (1816); Doubl., Gen. Diurn. Lepid., p. 81 (1847); Schatz, Exot. Schmett., ii., p. 136 (1887).

Type, *A. chloë* (Stoll).

Antennæ rather long, slender, and gradually thickened; palpi rather short; eyes naked. Wings rather broad, with the hind-margins rounded, and only slightly dentated; cells closed by rudimentary nervures, the fore-wings with the costa arched, and the hind-margin regularly curved.

"The larvæ resemble those of *Epicalia* [*Catonephele*], *Callithea*, &c., in being armed with branching spines, and in having two longer spines projecting from the summit of the head. They differ from the larvæ of allied species in having, besides the shorter spines of the body, several longer and thicker hispid lobes proceeding from the second, third, fifth, tenth, and eleventh segments. They feed on the leaves of a succulent climbing plant on the borders of woods.

"The chrysalides have a deep notch on the dorsal surface of the thorax, and two long flattened appendages proceeding from the head." (*Bates.*)

Boisduval and Doubleday treated this genus as a separate family, on account of the statement of Lacordaire that the pupa is girt with a silken thread; but on Bates discovering that this was an error, the genus was removed to the *Nymphalidæ*. Since then, however, Schatz has pointed out that Dr. W. Müller has made further observations in the transformations of *Ageronia*, from which it appears that the pupa has the habit of raising the fore part of its body into a horizontal position in daylight, but sinks back into the usual position of the pupæ of the *Nymphalidæ*, and hangs by the tail, when in darkness. That the species of *Ageronia* differ considerably both in habits and structure appears certain, and if this habit is peculiar to a species which was not bred by Bates (as is very possibly the case) it will account for his not having noticed it; for had he done so, he would certainly have recorded it. I do not remember that such a habit has been noticed in the pupa of any other Butterfly.

In many respects, this genus is one of special interest. The

species are not very numerous, but they are extremely abundant in Southern and Central America, to which regions they are confined. They are all of a blue or dark brown colour above, with white, brown, or blue spots, and markings, and often with a white bar across the fore-wings, especially in the females. The hind-wings are sometimes marked with a row of rather large, but not very sharply defined, sub-marginal eyes. The under surface is in some species brown, with red spots; in others, the fore-wings are marked beneath with black, white, and grey in varying proportions, and the hind-wings are white, red, or yellow, the borders being often varied with black and white. Only one species, *A. chloë* (Stoll),* is noticed by Bates as found in the shades of the forest; the others frequent "orange orchards, and open sunny places in the forest, settling on trunks of trees with wings expanded, and when sporting or quarrelling with a companion, make a sharp cracking noise with their wings." (*Bates.*) The peculiar stridulation of these Butterflies was first noticed by Darwin at Rio Janeiro, and recorded by him in the "Voyage of the Beagle."

AGERONIA ARETHUSA.

(*Plate XXII., Fig.* 1. *Female.*)

♂ *Papilio arethusa*, Cramer, Pap. Exot., i., pl. 77, figs. E. F. (1775).

♀ *Papilio laodamia*, Cramer, *op. cit.*, ii., pl., 130, fig. A. (1777).

This species is common in many parts of Central and Southern America. Cramer received both sexes from Surinam, but they differ so much, that he naturally supposed them to be different species. His figure of the female is here copied. The

* This is the type of the genus; it is dark blue, with red spots in the cells of the wings, and numerous black ones beyond; there is an incomplete sub-marginal row of black eyes with white pupils, and there are some whitish spots towards the tip of the fore-wings.

female measures three inches across the wings, and the male a little less. The latter is of a velvety-black colour, with many rows of small blue spots, arranged in two or three rows along the hind- and inner-margins, and along the costa of the fore-wings, the costa of the hind-wings being light brown. The rows of blue spots in the cell of the fore-wings do not extend beyond it, and those on the inner-margin cease at about half its length, leaving the middle of both pairs of wings free from spots, within the sub-marginal rows, from below the costa of the fore-wings, to the inner-marginal spots of the hind-wings. In the female, which we have figured, the whole surface of the wings is covered with larger blue spots than in the male, arranged in rows, more or less parallel to the hind-margins, or to the inner-margin of the fore-wings. A rather broad white band, with a slight yellowish shade and with parallel sides above, but sloping outwards to a point below, runs from the middle of the costa of the fore-wings to two-thirds of the length of the hind-margin. The costa of the hind-wings is of a light brown with some reddish markings.

The body is black above, spotted with blue, and the under surface in both sexes is of a dull black (greyish-brown along the inner-margin of the fore-wings), and the pectus and base of the fore-wings are marked with several crimson spots; the hind-wings are marked with a row of large crimson sub-marginal spots, usually obsolete towards the costa, and there is also one on the inner-margin.

The insect varies a little in the number, size, and arrangement of the blue spots of the upper, and the red spots of the under surface, and I have seen no specimens exactly corresponding with Cramer's figures. Whether these variations are local, casual, or betoken closely-allied species rather than varieties, can only be ascertained either by breeding, or by the examination of large series from different localities.

AGERONIA AMPHINOME.

(*Plate XXII., Fig.* 2.)

Papilio amphinome, Linnæus, Syst. Nat. (x.), i., p. 473, no. 95 (1758); Cramer, Pap. Exot., i., pl. 54, figs. E. F. (1775).

This Butterfly measures about three inches and a half across the wings, which are black above, covered with pale blue markings of various shapes; one row of blue spots towards the hind-margin of the hind-wings is imperfectly enclosed by curves and angles in such a way as to form a series of incomplete oval ocellated spots. From just beyond the middle of the costa of the fore-wings, a rather broad white band, with irregular edges, runs nearly to the hinder angle. The under surface is black, the basal area being occupied by crimson markings divided by the nervures, and radiating outwards from the base, extending, parallel to the inner-margin, nearly to the anal angle on the hind-wings; above the anal angle, the streaks are shorter, and partly broken into spots. The white band is well marked on the under surface, and more sharply defined than on the upper, though its edges are still irregular. There is also a row of marginal and sub-marginal white spots on all the wings, the latter being replaced on the lower part of the hind-wings by the red spots which form a continuation of the basal markings.

It is a common Butterfly in Southern and Central America.

GENERA ALLIED TO AGERONIA.

Panacea, of Godman and Salvin, is considered to be the nearest allied genus to *Ageronia*, but the species are larger and more robust, and much more handsomely coloured. The species of *Panacea*, which are found in various countries of the northern half of South America, are blue, striped with black towards the base, and are black towards the apex of the fore-wings, and sometimes on the borders of the hind-wings; the blue portion of

1. *Agermia arethusa*
2. " " *amphinome*

AGERONIA AMPHINOME.

(*Plate XXII., Fig.* 2.)

Papilio amphinome, Linnæus, Syst. Nat. (x.), i., p. 473, no. (1758); Cramer, Pap. Exot., i., pl. 54, figs. E. F. 1171

This Butterfly measures about three inches and a half a[illegible] the wings, which are black above, covered with pale [illegible] markings of various shapes; one row of blue spots [illegible] the hind-margin of the hind-wings is imperfectly enclosed [illegible] curves and angles in such a way as to form a series of [illegible] plete oval ocellated spots. From just beyond the middle [illegible] the costa of the fore-wings, a rather broad white band, [illegible] irregular edges, runs nearly to the hinder angle. The under [illegible] face is black, the basal area being occupied by crimson [illegible] ings divided by the nervures, and radiating outwards from [illegible] base, extending, parallel to the inner-margin, nearly to [illegible] anal angle on the hind-wings; above the anal angle, the stro[illegible] are shorter, and partly broken into spots. The white band [illegible] well marked on [illegible] more sharply defin[illegible] than [illegible] gh its [illegible] are still irregular. The [illegible] [illegible] are [illegible] white spots on [illegible] [illegible] on the lower part of t[illegible] [illegible] form a continuation of t[illegible]

[illegible] Southern and Central Americ[illegible]

[illegible] TO AGERONIA.

1. *Agerونia arethusa*
2. " " *amphinome*

the wings is bounded outside, at least on the fore-wings, by a broad green band; the under side of the hind-wings is brown or red, with a slightly-marked row of ocellated spots. Of the habits of one of the best known species, *P. prola* (Doubleday and Hewitson), found in New Grenada and on the Upper Amazons, Bates remarks: "It descends into sunny openings, and into open grounds on fine days, entering the houses in villages and settling on the whitewashed walls, with its wings sometimes expanded and sometimes erect. Its flight is extremely rapid and bold." About half-a-dozen species of *Panacea* are now known.

Batesia, Felder, is another magnificent genus, of which one or two closely-allied species or varieties inhabit the north-west of South America. They measure about four inches across the wings, which are black above, with the base and centre of the hind-wings deep blue, and a broad oblique crimson band on the fore-wings. The under side shows no blue, but the hind-wings are dull yellow with a black border.

Another South American genus which we may mention here, is *Ectima*, Doubleday, which includes rather small and inconspicuous Butterflies, measuring about an inch and a half across the wings, which are shaped nearly as in *Ageronia*, but the hind-wings are a little more square. They are of a slaty-grey above, with a white oblique band on the fore-wings; the under side is paler. There are only a few species known, but they are widely distributed in South America, and they sit with their wings expanded, after the fashion of *Ageronia*.

Following the genera which are more distinctly allied to *Ageronia*, are placed some rather isolated Tropical American forms, distinguished by the inflated costal nervure, most of which were formerly located, with others, in the *Eurytelidæ*.

The first of these genera, *Didonis*, Hübner, is one of the most easily recognised of all the American *Nymphalinæ*. The

Butterflies measure rather more than two inches in expanse, and have rounded wings and slightly denticulated hind-wings. The wings are smoky-brown, and the hind-wings have a bright red marginal or sub-marginal band; on the under side, which is paler, the band is mixed with white, and there are some red spots near the base. There are only a few species or varieties, differing chiefly in the width of the red band. "The caterpillars much resemble those of *Ageronia*, and the Butterflies frequent waste ground on the borders of the forest, hovering slowly over bushes." (*Bates.*)

Next to *Didonis* we may place *Cystineura*, Hübner, a genus with longer and narrower wings, but much smaller (expanding about an inch and a half), and very differently coloured. The species are black and white, or light brown and white, and several are peculiar to the West Indies, while others inhabit different parts of Southern and Central America. The prettiest is *C. dorcas* (Fabricius), which is common in Jamaica, and is of a pale orange-yellow.

Vila, Kirby, is another South American genus, closely allied to the last. These Butterflies fly low, and hover over the herbage in the forest with expanded wings. They are about two inches in expanse, and are black, with very long fore-wings, rounded at the tip, and are not unlike some of the *Ithomiinæ* in shape, except that the wings, especially the hind ones, are broader. They are black, with a white transverse stripe near the base, and large white blotches on the fore-wings; on the under side there is a large white blotch on the hind-wings also, and the dark portion of the wings is intersected by tawny stripes.

The genus *Pyrrhogyra* includes larger insects, measuring two inches and upwards in expanse. The fore-wings are broad, hardly longer than the hind-wings, with the hind-margin slightly oblique. The hind-wings are long and broad, slightly

dentated, and with a short tooth rather below the middle of the hind-margin. The wings are black, with a broad transverse white or pale green band running across both pairs of wings, and sometimes extending to the base and inner-margin on the hind-wings. It does not reach the costa of the fore-wings, but parallel to its upper end is an oblique stripe from the costa, and towards the tip is another small spot. On the under side the pale markings are more extended, and the dark spaces around and between them are intersected by red stripes. In shape and colouring these Butterflies resemble *Victorina* and *Adelpha*.

The species of *Pyrrhogyra* are common and widely distributed in Tropical America. "They frequent narrow sunny openings in the lofty and humid forests, and have a sailing and wheeling flight, soaring rapidly to the tops of the trees, if rudely disturbed whilst hovering nearer the ground. The larvæ of *Pyrrhogyra tiphus* and *P. neærea* (Linn.) resemble in shape and armature those of *Epicalia* (*Catonephele*) and *Callithea*, having two long verticillate cephalic spines, and numerous shorter abdominal spines with radiating smaller spines at their tip." (*Bates*.)

GENUS MARPESIA.

Marpesia, Hübner, Verz. bek. Schmett., p. 47 (1816).

Type, *M. eleucha*, Hübner.

There is a small American group of tailed *Nymphalidæ* comprising the two genera *Timetes*, Boisduval, and *Marpesia*, Hübner. They agree in the following characters: the long slender antennæ, with an oval club; the long, thickly scaled palpi; the open wing-cells; the short spur at the base of the median nervure on the fore-wings; and in the long tailed hind-wings. They are generally brown, with pale bands, or tawny, with brown bands; but they differ considerably in shape. *Timetes* has short triangular fore-wings, rarely pointed at

the tip, and in the hind-wings one long tail is developed at the outer angle, that at the anal angle being generally rudimentary, so that the insect much resembles a *Papilio* in shape. But in *Marpesia* the fore-wings are very long and pointed, and the hind-margins are very oblique from below the sub-apical projection on the fore-wings to the base of the first tail on the hind-wings. The hind-wings are provided with two long tails, that at the anal angle being much shorter and broader than the other. There are intermediate forms between the two genera, but the figures on our plate represent that species of *Marpesia* which exhibits the peculiar characters of the genus in greater perfection than even *M. eleucha* (Hübner), the type of the genus, which is nearly similar in colour, though paler, but has shorter and broader wings. The latter is more restricted in its range, being found in the West Indies and the Southern United States, whereas *M. peleus* is common throughout Tropical America.

The larva of *Marpesia peleus* is naked, with four long, fleshy, filaments on the back, and two others projecting from the hinder part of the head. The pupa is likewise furnished with several projecting filaments.

Bates describes the species of *Timetes* as frequenting sunny places in the forest, and flying about and sitting on the trees, or resorting to the moist banks of brooks or pools.

MARPESIA PELEUS.

(*Plate XXV., Fig.* 1.)

Papilio peleus, Sulz., Abgek. Gesch. der Insecten, pl. 13, fig. 4 (1776).

Papilio thetys, Fabr., Gen. Insect., p. 264 (1777).

Papilio petreus, Cramer, Pap. Exot., i., pl. 87, figs. D. E. (1776); Stoll, Suppl. Cramer, pl. 2, figs. 2, a–c (1787).

This curious Butterfly measures about three inches across

the wings, which are very long and narrow, and of a very peculiar shape. The costa of the fore-wings is strongly arched, and bent downwards at the extremity, just below which, on the upper part of the hind-margin, is a strong projection. Under this the wing is deeply concave, and then the outline runs obliquely to the anal angle of the hind-wings. The hind-margins are regularly dentated, and at the anal angle of the hind-wings is a broad obtuse tail, curved slightly outwards and separated by a curve of about its own length from a rather narrower and much longer tail on the hind-margin. The wings are fulvous (almost "Fritillary" colour) and are crossed by three brown lines varying in width; between the two first is a short streak near the costa of the fore-wings; and sometimes two shorter ones between the base and the first line. The outer portion of the costa of the fore-wings, and a sub-marginal line, as well as the hind-margin of the hind-wings, and the region of the anal angle, are likewise brown. Towards the anal angle of the hind-wings is a slightly marked brown eye, surrounded by one or two alternating grey and brown lines. The under side is of a purplish-brown, with some brown lines, partly bordered with whitish in the cell of the fore-wings, and traces of the three brown lines, the first and third more or less indistinct, and edged with whitish on the outside, the middle one well marked, and edged with whitish on the inside.

Stoll's account of the larva and pupa is as follows: "The head of this beautifully coloured caterpillar is dull yellow, with two short rays and small spots of black. The head is furnished with two long black spines, garnished with short stiff hairs. The first five segments of the body are reddish-brown, spotted with black. The belly is white, and the anterior legs black. The rest of the body is reddish-brown, but from the sixth to the eleventh segment the back is of a beautiful yellow, and bordered on the sides with short black and white rays.

The back is armed with four long spines, the last of which placed on the eleventh segment, is curved backwards, and very similar to the horns with which most of the caterpillars of the Sphinges are provided. The intermediate and posterior legs are yellow. It feeds on the leaves of the cashew-tree (*Anacardium occidentale*), and transforms into a perpendicular chrysalis of a yellow colour, spotted with black, garnished with black spines on the head, thorax, and back. When the Butterfly is about to appear, the yellow colour changes into white."

"A common insect in Tropical America, in open sunny places, gardens, plantations, and banks of streams; settling on flowers, and on the ground in moist situations." (*Bates.*)

OLD WORLD GENERA ALLIED TO MARPESIA.

The genus *Cyrestis*, Boisduval, is the Old World representative of *Timetes*; but it includes much more delicately formed species, with shorter tails, and generally with a strongly marked lobe at the anal angle of the hind-wings. The species are generally white, with or without darker borders, and marked with slender transverse lines of black, or pale yellow; some species are brown, with a transverse white band, and others are yellow instead of white. They have a stronger flight than might be expected from their weak conformation, and are in the habit of settling on the under side of leaves. The species measure from two to three inches across the wings, and inhabit India and the Malayan islands as far as New Guinea. One or two white species are found in West Africa and Madagascar.

In typical *Cyrestis* the first and second sub-costal nervules of the fore-wings are emitted before the end of the cell, but Distant has separated two or three of the smaller species formerly included in the genus, in which only the first sub-costal nervule is emitted before the end of the cell under a distinct genus, *Cher-*

sonesia, Distant. The few species of *Chersonesia* known are found in India, Malacca, Java, &c., and hardly measure an inch and a half in expanse. They vary in colour from pale ochraceous to fulvous, with transverse brown bands, and the projecting tooth or tail of the hind-margin of the hind-wings is nearly obsolete, and the lobe at the anal angle wholly so.

GENUS LIMENITIS.

Limenitis, Fabricius in Illiger, Mag. Insekt., vi., p. 281 (1807); Westw., Gen. Diurn. Lepid., p. 274 (1850); Schatz, Exot. Schmett., ii., p. 157 (1888).

Type, *L. camilla* (Linn).

Eyes hairy; antennæ long, thickening gradually from near the middle almost to the apex, the club being slender and elongated; palpi not approximating at the tip, bristly, the basal joint shortest and nearly oval, the second very long, and the terminal joint elongate-ovate, ending suddenly in a point; fore-wings rather longer than broad, the hind-margin slightly oblique, about as long as the inner-margin; hind-wings rounded, the hind-margins slightly denticulated; abdominal groove well marked; legs alike in both sexes, the front pair short and slender, the tarsus consisting of a single joint ending in a small claw, the other tarsi with two claws, and a small pulvillus between them.

The larva has a bifid head, obtuse fleshy projections on the back and numerous shorter spines, fringed with hair (Plate iii., fig. 7). The pupa has also a bifid head.

Limenitis is at present a very ill-defined genus, and is used to include a number of species from Europe, Asia, the Eastern Archipelago and North America, which differ greatly in structure and neuration. Of the three European species which are generally referred to it, *L. camilla* is the only one which has hairy eyes, and the little group represented by *L. camilla*

Linn. (= *L. sibylla*), and *L. drusilla*, Bergstr. (= *L. camilla*, Denis), is entirely confined to Europe and Northern and Western Asia. *L. drusilla*, which is common on the Continent, is more bluish-black than *L. camilla*, and the white spots are more numerous and more detached. It differs a little in its habits, although it so much resembles *L. camilla* in appearance, and feeds, like the latter, on honeysuckle; but it appears a little later in the summer, and prefers to sport round bushes.

Linnæus, in 1767, described the sexes of *L. sibylla* under the names of *Papilio sibylla* and *P. camilla*, but the latter name was subsequently adopted by continental entomologists for *L. drusilla*, though our "White Admiral" was generally called *L. camilla* by the older English writers on entomology. This once gave rise to a very curious error. An amateur naturalist who used to travel about in out-of-the-way parts of the country, and make all sorts of wonderful discoveries, once announced that he had caught the White Admiral in a county where it had never been seen or heard of before, and where it was most unlikely to be found. On being asked to verify his assertion, he produced a specimen of *L. drusilla*. If this Butterfly is ever rediscovered in the locality where he professed to have found it, it will be enough; but until then, it is hardly uncharitable to imagine that he may have been fishing with a silver hook for *L. camilla*, and captured a continental specimen of *L. drusilla* instead.

THE WHITE ADMIRAL. LIMENITIS CAMILLA.

(*Plate XXIII., Fig.* 3; *larva, pl. iii., Fig.* 7.)

Papilio camilla, Linn., Mus. Ludov. Ulr., p. 304 (1764); id. Syst. Nat. (xii.), i., p. 781, no. 187 (1767); Esper, Schmett., i. (1), p. 188, pl. 14, fig. 3 (1777); Aurivillius, Recens. Crit. Lepid. Mus. Ludov. Ulr., p. 101 (1882).

1. 2 Pyrameis atalanta.

3. Limenitis camilla.

Papilio prorsa, Linn., Mus. Ludov. Ulr., p. 303 (1764, nec Linn., Syst. Nat. 1758 et 1767).

Papilio sibilla, Linn., Syst. Nat. (xii.), i., pt. 2, p. 781, no. 186 (1767); Esper, Schmett., i., pt. 1, p. 187, pl. 14, fig. 2 (1777).

Limenitis camilla, Curtis, Brit. Ent., iii., p. 124 (1826); Steph., Ill. Brit. Ent. Haust., i., p. 52 (1127).

Limenitis sibylla, Kirby, Eur. Butterflies and Moths, p. 23, pl. x., figs. 2, a–e (1878); Lang, Butterflies Eur., p. 162, pl. 38, fig. 1 (1882); Buckler, Larvæ of Brit. Butterflies and Moths, i., p. 36, pl. 7, fig. 1 (1886); Barrett, Lepid. Brit. Isl., i., p. 117, pl. 17 (1892).

This is one of the many insects which are almost confined in England to woods in the southern counties, where it was formerly much more abundant than at present. It has an elegant sailing flight through the glades and along the edges of woods, and appears in June and July. The contrast of black and white in this Butterfly makes it a very conspicuous object on the wing. Its flight is sustained, but not very lofty.

Haworth ("Lepidoptera Britannica," p. 30) remarks: "The graceful elegance displayed by this charming species when sailing on the wing, is greater perhaps than can be found in any other we have in Britain. There was an old Aurelian of London, so highly delighted at the inimitable flight of *P. camilla* that long after he was unable to pursue her, he used to go to the woods, and sit down on a stile, for the sole purpose of feasting his eyes with her fascinating evolutions."

The Rev. Revett Sheppard, writing in Miss Jermyn's "Butterfly Collector's Vade Mecum" (ed. 2), p. 121, likewise says: "In its beautiful flight, when it skims aloft, it rivals the Purple Emperor, which it strongly resembles in appearance." (This appears to me to be rather an exaggerated statement.) "It seems, however, unlike the latter to avoid the sunbeams, for it

LIMENITIS DRUSILLA.

Papilio sibylla, var. Drury, Ill. Exot. Ent., ii., pl. 16, figs. 1, 2 (1773); Cramer, Pap. Exot., ii., pl. 114, figs. C. D. (1777).

Papilio camilla, Den. and Schiff. (nec Linn.), Syst. Verz. Schmett. Wien, p. 172, no. 3 (1776); Hübner, Eur. Schmett., i., figs. 106, 107 (1794?).

Papilio lucilla, Esper (nec Den. and Schiff.), Schmett., i., pt. 1, p. 351, Taf. 36, fig. 2 (1777).

Papilio drusilla, Bergsträsser, Nomencl., iii., pl. 67, figs. 5, 6 (1779).

Limenitis sibylla, Steph., Ill. Brit. Ent. Haust. i., p. 52, note (1827).

Limenitis camilla, Kirby, Eur. Butterflies and Moths, p. 23 (1878); Lang, Butterflies Eur., p. 161, pl. 33, fig. 3 (1882).

GENUS NEPTIS.

Neptis, Fabricius in Illiger, Mag. Insekt., vi., p. 282 (1807); Westw., Gen. Diurn. Lepid., p. 270 (1850); Moore, P. Z. S., 1858, p. 3; Schatz, Exot. Schmett., ii., p. 152 (1888).

The type is

NEPTIS ACERIS.

Papilio aceris, Lepechin, Reise, i., p. 203, pl. 17, figs. 5, 6, (1774); Esper, Schmett., i., pt. 2, p. 142, pl. 81, figs. 3, 4 (1783).

Neptis aceris, Kirby, Eur. Butterflies and Moths, p. 22 (1878); Lang, Butterflies of Europe, p. 165, pl. 38, fig. 3 (1882).

A black species, expanding from one and a quarter to two and a quarter inches across the wings. The fore-wings have a transverse row of white spots, interrupted opposite the white trifid basal streak, and the hind-wings have a white transverse band towards the base, and a row of white spots between this and the hind-margin.

It is common throughout the East Indies, and Western and Central Asia, and is also found in some parts of Eastern Europe. The reddish-brown larva has two spiny tubercles on the third, fourth, and eleventh segments, and feeds on *Orobus vernus* in spring and summer.

These Butterflies much resemble the species of *Limenitis*, the best known form of which is our "White Admiral," but the fore-wings are shorter and more rounded, and have no spur at the base of the median nervure. They are most numerous in Southern Asia, but extend to the border-countries of the Indian and Palæarctic Regions, and are found in China and Japan. Several species, too, are met with in Western Asia, and two extend to Eastern Europe. The genus is also found in Africa, but the species are less numerous there than in the East Indies.

Nearly all the species are black or brown, with white or tawny markings, usually consisting of a streak from the base of the fore-wings, often broken into two or three parts, a broad band reaching across the wings, and a narrow submarginal line, more or less interrupted. One curious species, *N. raddei*, Bremer, is nearly black. It is found on the Amoor river and in Japan.

Mr. Trimen describes the South African species of *Neptis* as frequenting wooded spots, where they flit slowly about the trees, and settle on the leaves, often with their wings extended.

NEPTIS NICOMEDES.

(*Plate XX., Fig.* 3.)

Neptis nicomedes, Hewitson, Entomologist's Monthly Magazine, vol. 10, p. 205 (1874).

Male.—Above dark brown. Both wings crossed at the middle by a broad band of white (oblique on the anterior wing,

transverse on the posterior), followed by a band of indistinct grey spots, and by three sub-marginal linear bands of white; the inner band (which is most distinct on the anterior wing) broken into spots. Anterior wing with two white spots within the cell, the one near the base minute, the other broader; a bifid white spot on the middle of the inner-margin.

Under side.—As above, except that it is paler, and that the posterior wing has the base of the costal margin broadly white, and a linear white spot below it. Expanse, 1·6 inch.

This species was taken in Angola by Mr. Rogers, one of Mr. Hewitson's collectors. The above description is copied from the original.

EXOTIC GENERA ALLIED TO LIMENITIS AND NEPTIS.

Indo- and Austro-Malayan Sub-regions.

The Eastern species referred to the genus *Limenitis* are large and handsome Butterflies, sometimes measuring as much as five inches across the wings. They are sometimes green or greenish-brown, frequently with a transverse white band, but many species have the greater portion of the wings reddish-tawny, with a white band across the middle, or some large white connected spots in the middle of the fore-wings.

Lebadea (Felder), another East Indian genus, much resembles *Limenitis*, but the species are dull tawny and brown, with rows of connected white and brown zig-zags across the wings; the tip of the fore-wings is generally whitish. They measure rather less than three inches in expanse.

Pandita (Moore) is another small genus, including a few species found in the Malay Peninsula and the neighbouring islands. They measure two inches, or a little more, across the wings, which are broad and rather short, with the hind-margins of the fore-wings not concave. The wings are fulvous, more

or less brown at the base, and traversed by broad, slightly undulating brown lines.

The genera *Neptis*, *Athyma*, and *Abrota* are all very similar in colour and markings, and are all confined to the Eastern Hemisphere, except *Neptis*, a few species of which extend to Africa and Eastern Europe, as we have already mentioned. They are almost all black or brown, with white or tawny markings. These generally take the form of a band, often more or less interrupted or macular, running from the middle of the costa of the fore-wings, and curving round to the inner-margin of the hind-wings. Beyond this, there is often an outer, narrower band, at least on the hind-wings, and often a row of dots or a sub-marginal line in addition. In the cell of the fore-wings is often a basal streak, either entire, or broken into two or three sections. Sometimes the male is white and the female tawny, or *vice versâ*, and sometimes there is a white or tawny belt at the base of the abdomen.

Parthenos, Hübner, is another genus which is confined to the tropics of the Eastern Hemisphere, and which contains some of the largest and handsomest Butterflies allied to *Limenitis*. They measure about four inches across the wings, which are more or less dentated, though the fore-wings are not concave; the hind-wings are often more or less angulated. The wings are generally dark brown, varied with green, lilac, or tawny, but there is always a row of large white spots running obliquely from within the tip of the fore-wings towards the inner-margin; and from the base of the fore-wings, and the base of the inner-margin of the hind-wings, several short broad black bands run out into the wing.

Ethiopian Region.

The African species of *Neptis*, one of which we have figured, need not detain us; they resemble the Indian species, but are generally rather smaller.

The genus *Catuna*, Kirby, is peculiar to Africa, and is rather varied in colouring, though not numerous in species. These Butterflies measure about two inches across the wings; some resemble the genera *Hamanumida* or *Aterica*, in shape and colour, being brown, with large black spots, and buff markings; while *C. cœnobita* (Fabricius) resembles a large *Neptis*, with markings of a slightly bluish-white; but the sub-marginal markings of the fore-wings are in the form of white arrow-heads.

Some of the remaining genera much resemble the Indian genera allied to *Euthalia*, Hübner, but of these Schatz and Röber make a separate group, chiefly on account of the great dissimilarity of the larvæ.

Hamanumida dædalus (Fabricius) is a very common African Butterfly, not remarkable for its size or beauty, but for the peculiarity of its coloration. It is scattered all over with white spots on a pale brown ground, very much after the fashion of a Guinea-fowl, a bird found in the same countries. The under side is ochreous-yellow, with more or less distinct white spots. The Butterfly is said to resemble *Pyrameis cardui* in its habits, and often to settle on the ground. It has been stated that its colour, which varies a little, is assimilated to that of the soil in the different localities in which it is found. It measures rather more than two inches across the wings.

Of the remaining African genera, four are rather numerous in species, and all are peculiarly characteristic of the Fauna of Tropical Africa. In southern Africa they are hardly represented, and what is more singular, one genus only is represented, by a single species, in Madagascar.

The genus *Aterica*, Boisduval, includes species of moderate size, measuring two inches or more across the wings. The fore-wings are short and the hind-wings rather long and somewhat narrow, the hind-margin not being rounded, but somewhat contracted. The type *A. rabena*, Boisduval, the only

species of this series found in Madagascar, is of a rich tawny colour, with the apical region of the fore-wings broadly black, and crossed by two oblique rows of yellow spots, the inner one formed of larger and nearly connected ones; the tip of the hind-wings is also black. The rest of the species all inhabit Tropical Africa, and differ considerably in colour and markings. One, *A. cupavia* (Cramer) is black, with two oblique rows of buff spots on the fore-wings, and a large oval spot, or short transverse band, in the middle of the hind-wings. The males of other species are brown, green, or tawny, crossed by darker bands or spots, while the females have usually an oblique white stripe across the fore-wings.

Schatz has lately founded the genus *Ctenandra* for *C. opis* (Drury), a species which differs considerably from *Aterica*, especially in the slightly angulated fore-wings. The male, which Drury described as a distinct species, under the name of *Papilio afer*, measures a little more than two inches across the wings, which are black, with transverse blue stripes, and some white spots near the tip of the fore-wings. The hind-wings are narrowed as in *Aterica*, but are more distinctly dentated, and are angulated towards the anal angle. The female is larger than the male, and is tessellated with large black spots and bands on a pale brown ground; a pale yellow band runs obliquely from the inner-margin of the hind-wings to the middle of the fore-wings, and between this and the costa is a row of white dots; the hind-wings are broader and less strongly dentated and angulated than in the male.

Cymothoë, Hübner, is a genus including larger and handsomer species, measuring from two to four inches across the wings. The fore-wings are usually more or less concave, and the hind-wings are more rounded than in *Aterica*, and often slightly produced at the anal angle. The sexes generally differ considerably. Some of the smaller species are of a bright red

in the males, almost blood-red; in the females, the margins and the greater part of the fore-wings are brown. In other species the males are yellow, varying in different species from a very pale straw-colour to a deep tawny; and the females are black or tawny, with white markings, sometimes in the form of a white transverse band as in *Limenitis*, sometimes as white zig-zag lines, and sometimes as large white spots on the fore-wings, a great part of the hind-wings being occasionally white.

Euryphene, Boisduval, is another genus, allied to those which we have been considering. The males of many of the smaller species resemble *Aterica*, being blue, brown, or tawny, with dark bands, and the females are usually tawny or reddish, with two white bands across the black tip of the fore-wings. In one section of the genus, however, the hind-wings and the inner-margin of the fore-wings are of various shades of green, and there is a white or yellow band across the apex of the fore-wings. These species much resemble the genus *Euphædra* in colouring, but the under surface is generally marked with a transverse or curved line, and the hind-wings are narrower and less strongly dentated.

Euphædra, Hübner, is one of the most beautiful and characteristic of all the genera of African Butterflies. Most of the species are of considerable size, expanding three inches and over, and always of conspicuous colours, fulvous, green, red, orange, or blue. The first group is of an orange-red, with the tip of the fore-wings broadly black, and marked with a large white blotch or band, and the hind-wings have a black border marked with a row of large white spots. Many African Butterflies and Moths, of half a dozen families and genera, are marked in this manner, so as to produce a greater or less resemblance to the abundant and highly-protected *Limnas chrysippus*.

Euphædra perseis (Drury) is brown, with large yellowish-white spots on the fore-wings, and the inner-margin and the hind-wings, except the borders, are rose-coloured. *E. zampa* (Westwood) is green above, with a short whitish oblique streak near the tip of the fore-wings; it has large white sub-marginal spots on the hind-wings, and more or less of the base of the hind-wings, and the greater part of the wings beneath are dull orange. *E. harpalyce* (Cramer) and its allies are brown above, with or without a transverse white or yellow stripe near the tip of the fore-wings, or they show a broad blue sub-marginal stripe on the hind-wings, tapering to the costa; the under side is green. Other species are velvety black above, with more or less of bronzy green on the wings, and the dark apex of the fore-wings crossed by a white or yellow stripe; the base of the wings is generally rose-red below, and sometimes above; in *E. xypete* (Hewitson) the greater part of the under side of the hind-wings is crimson.

Neogean Species.

Several species of true *Limenitis* are met with in the United States. They are generally larger Butterflies than their European representatives, measuring about three inches across the wings, which are black, often with a white bar across, and with red spots on the under side, and sometimes also above. Most of the species have the wings more dentated than those of the Old World, and sometimes angulated. The prevailing colour is black or dark brown, with bluish markings; but *L. archippus* (Cramer) forms an exception. It is of a rich tawny or fulvous colour, with conspicuous black nervures, and except that it is considerably smaller, it closely resembles *Anosia menippe*, Hübner, belonging to the *Danainæ*, the commonest and best protected of all the North American Butterflies.

But the principal American genus allied to *Limenitis* is *Adelpha*, Hübner. The species are very numerous throughout Tropical America, and one or two species extend as far north as California. A special historical interest attaches to the genus, as it was these species which first turned the attention of the late Mr. Hewitson to the study of Exotic Butterflies. He was at first, in the days of Curtis and Stephens, a diligent collector and observer of British insects of all Orders, and was likewise a well-known ornithologist, giving special attention to oology. But the time came when he discovered, as he says, in one of his own works, that a Butterfly might be beautiful, even if it was not a British species; and he became thoroughly fascinated with the study, disposed of all his other collections, and devoted the rest of his life to the formation and illustration of his great collection of exotic Butterflies, now in the British Museum. In its day, this collection had no rival, except the collections of Boisduval and Wilson Saunders.

As Mr. Hewitson used to relate to his friends, he was one day at Stevens' auction rooms, when he was attracted by a box containing several different species of *Adelpha* (Hübn.), or, as the genus used to be called, *Heterochroa* (Boisd.), all much alike and yet all obviously distinct. This seemed to him a remarkable fact at that time, and he bought the lot. As he turned round he saw Professor Westwood, who said to him, "What! Are you buying Butterflies?" "Yes, I am," he answered; and this incident turned the whole current of his life.

When this happened, we do not exactly know, for though Hewitson's first papers on Exotic Butterflies were on the genus *Heterochroa*, they were only published in the "Annals and Magazine of Natural History" in 1847; whereas, in the previous year, Edward Doubleday had commenced his great work on the "Genera of Diurnal Lepidoptera," which was completed

after Doubleday's death by Westwood, and was illustrated throughout by Hewitson. It is therefore probable that Hewitson had already commenced the formation of his collection before that time, especially as he began to publish his own "Exotic Butterflies" as early as 1851, and before the actual completion of the "Genera."

But to return from this digression, into which the recollection of an old friend has allured us, to the American genus *Adelpha*. These Butterflies are of moderate size, generally measuring about two or two and a half inches across the wings. The fore-wings are short, and the hind-wings are generally rather long, and sometimes dentated towards the anal angle, which is more or less produced. Most of the species have a transverse white or, more rarely, a green band across both wings, or on the hind-wings only; sometimes this is reduced to a large spot on the latter. On the fore-wings there is usually a tawny band or large blotch towards the apex or surmounting the white band; other species have brown hind-wings, and the fore-wings have an oblique red or white band, or a straight ferruginous one. Bates describes them as having a sailing flight over bushes and low trees; like *Limenitis*, also, some of the species will sometimes settle on the ground in moist places.

The genus *Dynamine*, Hübner, occupies rather an isolated position in the series of South American Butterflies. Bates placed it near *Pyrrhogyra*, and states that the flight is similar, but much weaker, and that the pupa is similar; but Schatz and Röber refer the genus to the neighbourhood of *Limenitis*, on account of the short bristle-bearing warts, and the absence of horns on the head of the caterpillar, which is shorter and more cylindrical than is usual in the *Nymphalidæ*. Bates describes the pupa of his *D. leucothea* as green, with he dorsal surface of the abdomen reddish, and with two short

curved processes on the back, one at the base of the abdomen, and one near the front border of the thorax. Müller, as quoted by Schatz and Röber, says the pupa has two short horns on the head, and two strong beak-like projections on the second and fifth segments. Bates does not mention horns on the head. More information is much needed respecting the transformations of the various species of *Dynamine*. They differ considerably, and will probably be sub-divided into two genera. The pupa described by Bates belonged to the first section; that described by Müller probably to the second. In those of the first section, the sexes much resemble each other. They are white, with black borders, generally with a blue mark at the base, and with some white spots towards the tip of the fore-wings. On the under surface they are coloured nearly as above, but the margins are interlined with reddish, bordered with pale blue, and there are other reddish lines and markings on other parts of the wings. The hind-wings, except the base and margins, and sometimes a reddish blotch on the costa, are usually quite white beneath. These are among the smallest *Nymphalinæ*, some of them hardly exceeding an inch in expanse, and might easily be mistaken for *Lemoniidæ* or *Lycænidæ* at the first glance.

The species belonging to the second section are larger insects, measuring from an inch and a half to nearly two inches across the wings. The males are most frequently bronzy-green, with the margins, and especially the tip of the fore-wings, black, with green or white, or more rarely, dull yellow spots. In the male of *D. erchia* (Hewitson) a great portion of the outer part of the wing is orange. The green varies much in shade, being sometimes golden-green, or bluish-green; but there are two or three species in which the males are of various shades of bright blue, with narrow black borders, and the tip of the fore-wings broadly black, scarcely, if at

all, spotted with white. The females are very different, being dark brown, with the tip of the fore-wings spotted with white. From near the base of the inner-margin of the hind-wings a white stripe runs obliquely upwards to the middle of the fore-wings; this is sometimes absent. Beyond this is a much broader white band, generally extending over more or less of the fore-wings, and outside this is generally a third and more slender sub-marginal line; occasionally the females are tinged towards the base with the green colouring of the males. On the under surface, both sexes are marked somewhat as in the female above, except that the black part of the fore-wings is varied with blue lines and tawny lines or spaces. On the hind-wings, the dark transverse bands of the wings are either entirely tawny or are narrowly edged with black; sometimes, however, the hind-wings are nearly white beneath, with narrow transverse lines. The hind-margin of the hind-wings is generally much paler than above, and often presents a very characteristic mark, which, when present, admits of no mistake respecting the genus. It consists of two large eyes, with white or blue pupils in black and tawny rings.

INDIAN AND AUSTRALIAN GENERA ALLIED TO EUTHALIA.

These form a restricted group closely allied to the African genera of the *Limenitis* group, but they may be treated as a separate section on account of the remarkable structure of the caterpillars, which are furnished with very long plumose appendages almost like feathers. The numerous and closely allied species of *Euthalia* and *Tanaecia* are almost confined to India, the Malay Peninsula, and the adjacent islands, but species of *Symphædra* are met with as far east as New Guinea and Australia. They measure from two to four inches across the wings.

The genus *Euthalia*, Hübner, has triangular fore-wings,

and more or less dentated hind-wings, a little longer than broad. A great number are brown above, with straight or zig-zag brown lines; the males of several species have blue borders to the wings, which become narrower and often cease before reaching the costa of the fore-wings. Many species are broadly white towards the borders and intersected with a zig-zag black line. Some species are ornamented with red spots below, and sometimes also above, while the larger ones, which measure four inches in expanse or thereabouts, are generally brown or greenish-brown, with white or pale yellow markings. The larvæ feed on the mango as well as on other less familiar plants.

Tanaecia, Butler, differs from *Euthalia*, chiefly in the terminal joint of the palpi being slender and bristle-shaped instead of obtusely pointed. The species are not very numerous, and inhabit the Malay Peninsula, and the large adjacent islands of Java, Sumatra, and Borneo. These Butterflies are generally under three inches in expanse, and resemble the section of *Euthalia* in which the males are brown with a blue border, and the females have a bluish-white band towards the margins, intersected by a zig-zag line.

Symphædra, Hübner, has short fore-wings, with the costa very slightly oblique, and very slightly, if at all, emarginate; the hind-wings are regularly rounded and dentated, but the species differ much from *Euthalia* in the arrangement of their colour and markings. One of the smallest and commonest species is the Indian *S. nais* (Forster) which measures a little more than two inches across the wings. It is of a rich fulvous colour, with a narrow black border, two short black stripes running from the costa of the fore-wings, and a black line or row of dots beyond; the under side is darker, with some yellowish marks. Another, and larger, species, *S. æropa* (Linn.), which is met with in the Moluccas, and is found as far as Australia, is

dark brown, with a broad fulvous band towards the margins; these are narrower, and spotted with black in the females of *S. dirtea* (Fabricius) and its allies. These species are met with in the Indian and Austro-Malayan Regions generally, and are large and conspicuous Butterflies, measuring from three to four and a half inches across the fore-wings, which are longer and more pointed than in *S. nais*, which is the type of the genus. The males are black, with a sub-marginal green band, tapering inwards, on the fore-wings, and a broad sub-marginal purple band on the hind-wings; the under surface is rusty-brown, with the lower and outer half of the fore-wings black, spotted with white. The females are brown, with white or pale yellowish spots in the cell of the fore-wings; an oblique band sloping inwards from the costa nearly at its extremity, and angulated below, where it runs to the base; and a sub-marginal row of spots more or less tinged with orange. The sub-marginal spots are continued round the hind-wings, where there are three rows of spots running outwards from the inner-margin; at their extremity they converge slightly, and the outermost curves upwards to the costa; the under side is often suffused with pale blue. These Butterflies are easily attracted by fruit, especially pine-apple.

SUB-FAMILY VI. APATURINÆ.

Eggs.—Large, few in number, globular and hard, not so high as broad, with obscure ribs and cross-lines at the base only, usually forming tetragons, with minute projecting points at their intersection.

Larva.—Generally green, smooth, slug-shaped (spiny in *Aganisthus*), tapering at the ends, with two or four protuberances on the head, and often a bifid tail. It feeds on trees.

Pupa.—Short and broad, often with a bifid head, generally green, but not metallic.

Imago.—Very robust, and generally of large size, the wing-cells open, or closed with a rudimentary nervule; hind-margin of the fore-wings nearly always more or less concave; hind-wings often tailed; antennæ long, thick, gradually produced into a well-marked club; eyes naked.

Range.—With the exception of *Apatura*, which is found over the greater part of Europe and North America, the *Apaturinæ* are almost entirely tropical or sub-tropical Butterflies, and the range of the genera is usually restricted to a single geographical region, within which that of the different species is necessarily still more restricted. They are, however, insects of powerful flight, but as they are forest-loving and mostly tree-feeding species, they never seem to stray far from the neighbourhood where they lived as caterpillars. Their habits are sufficiently discussed under the genera and species, which we now proceed to notice.

Entomologists have never been in accord as to whether the *Apatura* group should be treated as a separate section of the *Nymphalinæ*, or not. I have already mentioned (p. 44) that the late Mr. Jenner Weir was convinced of the propriety of the former course, and I am glad to adopt his views upon the subject, as a tribute to the memory of a kind friend, on whose judgment one could always rely.

GENUS APATURA.

Apatura, Fabr., in Illiger, Mag. Insekt., vi., p. 280 (1807); Westw., Gen. Diurn. Lepid., p. 302 (1850); Schatz, Exot. Schmett., ii., p, 165 (1888).

Type, *A. iris* (Linn.).

Eyes naked; antennæ long, thick, straight, the club elongate-ovate; palpi long, and projecting beyond the head, with the basal and terminal joints of nearly equal length, the latter conical and scaly, the intermediate one very long, slender,

curved and bristly. Fore-wings somewhat triangular, the costal nervure very strong, the hind-margin slightly scalloped; hind-wings with the hind-margin regularly curved and slightly scalloped; front legs small and imperfect in both sexes, the tarsi often indistinctly jointed in the male.

Larva smooth, with two horns on the head. Pupa likewise with a bifid head.

The genus *Apatura* is the only British representative of an extensive group of *Nymphalidæ* with naked larva, which authors have usually included in the sub-family *Nymphalinæ*. It is widely distributed throughout the world, except in Africa; but the tropical species are generally much inferior to our own both in size and beauty, though one or two Indian and South American species are remarkable for the brilliant white or silvery colouring of the under surface. There are only two European species, *A. iris* (Linn.) and *A. ilia* (Denis), the latter of which differs from ours in having a distinct eye-spot towards the hinder angle of the fore-wings above, and in the more regular markings of the hind-wings beneath; and it has a tawny variety known as *A. clytie* (Denis). The European species are insects of very lofty flight, but occasionally descend to drink at muddy places in pathways, or they may be attracted by dung or carrion. They are by no means uncommon in various parts of the Continent, and may often be seen flying together. The male of *A. iris* especially likes to sport about the tops of trees, and generally seeks the highest elevation. I once took a specimen at rest at the top of a high hill which happened to be covered, not with trees, but with bushes.

Haworth's account of its habits has often been quoted, but it is so good, that we may be allowed to copy it once more from his "Lepidoptera Britannica" (pp. 19, 20).

"The Purple Emperor of the British Oaks is not undeservedly the greatest favourite of our English Aurelians. In his manners

likewise, as well as in the varying lustres of his purple plumes, he possesses the strongest claims to their particular attention. In the month of July he makes his appearance in the winged state, and invariably fixes his throne upon the summit of a lofty oak, from the utmost sprigs of which, on sunny days, he performs his aerial excursions; and in these, ascends to a much greater elevation than any other insect I have ever seen, sometimes mounting higher than the eye can follow, especially if he happens to quarrel with another *Emperor*, the monarch of some neighbouring oak; they never meet without a battle, flying upwards all the while, and combating with each other as much as possible, after which they will frequently return again to the identical sprigs from whence they ascended. The wings of this fine species are of a stronger texture than those of any other in Britain, and more calculated for that gay and powerful flight which is so much admired by entomologists.

"The Purple Emperor commences his aerial movements from ten to twelve o'clock in the morning, and does not perform his loftiest flights till noon, decreasing them after this hour, until he quite ceases to fly about four in the afternoon, thus emulating the motions of that source of all his strength, the sun. The females, like those of many other species, are very rarely seen on the wing. . . . . Moses Harris tells us that 'the females are not met with on the wing so often as the males, some of which are very plentiful, but the females rare to be seen, of which the *Purple Emperor* is one capital instance. I have been informed Mr. Whitworth caught thirteen in one day, and but one female amongst them.'

"I can readily credit this, for in three days I took myself twenty-three (nine of them in one day), but never took a female at all. The males usually fly very high, and are only to be taken by a bag-net fixed to the end of a rod twenty or thirty feet long. There have been instances, though very rare, of their settling on

the ground near puddles of water, and being taken there. When the Purple Emperor is within reach, no fly is more easily taken than him; for he is so very bold and fearless that he will not move from his settling-place until you quite push him off; you may even tip the ends of his wings, and be suffered to strike again."

In the satirical poems of "Peter Pindar" (Dr. John Wolcott) published at the end of the last century, there is an amusing story of a tulip-fancier and an entomologist, and there seems to be no doubt that the Butterfly referred to is the Purple Emperor, though it is not a very likely Butterfly to be found in a flower-garden, and still less so to lead an entomologist a wild-goose chase over the beds; for if startled, it would probably soar away at once to the nearest high tree in the neighbourhood. I know of no Butterfly called "The Emperor of Morocco" in any entomological work.

The tulip-fancier was showing the entomologist his garden, and was descanting on his treasures,

> "When from a heap of dung, or some such thing,
> An Emperor of Morocco reared his wing."

The entomologist rushed after it, trampling down all the tulips, regardless of the shouts of his friend, who came up with him at last, just as he had lost sight of the Butterfly.

"Did you not see him?" asked the entomologist. "Who? What?" asked the distracted tulip-fancier. "The Emperor of Morocco," replied the entomologist. The tulip-fancier mournfully relaxed his grasp, murmuring:—

> "Mad, madder than the maddest of March hares!"

THE PURPLE EMPEROR. APATURA IRIS.

(*Plate XXIV.; larva, Plate III., Fig.* 6.)

Papilio iris, Linn., Syst. Nat. (x.), i., p. 476, no. 110 (1758); Esper, Schmett., i. (1), p. 139, pl. 11, fig. 1 (1777); i. (2), p. 109, pl. 71, fig. 4 (1781).

Apatura iris, Steph., Ill. Brit. Ent. Haust., i., p. 50 (1827); Curtis, Brit. Ent., viii., pl. 338 (1831); Kirby, Eur. Butterflies and Moths, p. 24, pl. 11, figs. 2, a–c (1878); Lang, Butterflies of Europe, p. 156, pl. 34, fig. 2, pl. 36, fig. 2 (1883); Buckler, Larvæ of Brit. Butterflies and Moths, i., p. 42, pl. 7, fig. 2 (1886); Barrett, Lepid. Brit. Isl., i., p. 105, pl. 16 (1892).

Var., *Apatura iole.*

Papilio iole, Den. and Schiff., Syst. Verz. Schmett. Wien, p. 172, no. 3 (1776); Esper, Schmett., i. (1), p. 376, pl. 46, fig. 1 (1778?).

Papilio iris, Esper, Schmett., i. (1), pp. 109, 114, pl. 71, fig. 1; pl. 72, fig. 1 (1781).

Papilio beroe, Fabr., Ent. Syst., iii. (1), p. 111, no. 341 (1793).

The Purple Emperor appears to be almost confined in England to the south-eastern counties, and it is doubtful whether it has ever been taken as far north as Yorkshire. It is only to be found in large old woods, where these still exist. Although the caterpillar feeds on sallow, the Butterfly, which appears in July, is fond of flying about the tops of tall trees, especially oaks. It is still fairly plentiful in suitable localities, though no longer found close to London, as was the case less than a century ago.

The Purple Emperor measures from two inches and a half to three inches and upwards across the wings, which are dark brown in the male, shot with brilliant purplish-blue, except on the hind-margins, which are of a light brown. There are several white spots towards the tips of the fore-wings, and also some larger ones running from the middle of the wing to the inner-margin, and continued as a slightly curved band across the hind-wings. Towards the hinder angle of the fore-wings is a rather indistinct round black spot, and towards the anal

angle of the hind-wings is a conspicuous black spot in a tawny ring; the hind-margins are also sometimes more or less interlined with tawny.

The female is larger than the male, and of a paler brown, and the purple reflection is wholly absent. On the under side the fore-wings are rusty-brown, inclining to black in the middle, with a large ocellus towards the hinder angle, corre-

Purple Emperor (*Apatura iris*). Under side of Female.

sponding to the indistinct spot above. There are two black spots towards the base, in addition to the white marks corresponding to those on the upper side. On the hind-wings the white band is broader than on the upper side, with its outer side more irregular; the eye towards the anal angle is smaller; and the base and marginal portions of the wing are greyish, with something of a pearly lustre, and with a faint undulating brown line running along the hind-margin. The body is black above, and the legs and under side are greyish-white. The figures in

our plate represent both surfaces of the male. We add woodcuts of the under side of the female and of the upper side of the rare variety *A. iole* (Denis), in which the white band on the hind-wings is absent.

Upper side of the Variety (*A. iole*).

The larva is green, with several oblique yellow lines, and with two horns on the head tipped with red, and with a yellow stripe down the outer side. It feeds on sallow, and sometimes on aspen and poplar, and may be looked for in spring.

The pupa is likewise of a pale green, with a bifid head.

GENUS THALEROPIS.

Thaleropis, Staudinger, Cat. Lep. Eur., p. 17 (1871); Schatz, Exot. Schmett., ii., p. 166 (1888).

This genus was founded to receive a moderate-sized, but very handsome, Butterfly from Asia Minor, which was originally described by Eversmann as a *Vanessa*, and shortly afterwards, by Herrich-Schäffer, as an *Apatura*. The discovery of the

larva, however, which is smooth and tapering at the ends, with two short horns on the head and a bifid tail, prove it to be allied to *Apatura*, from which the Butterfly differs by its hairy eyes and closed wing-cells.

As the Butterfly is a species of considerable interest, and has only hitherto been figured in a few scarce and expensive continental works, we are glad to give it a place on one of our plates. One or two African species have lately been referred to *Thaleropis*, but it is not quite certain that they actually belong to that genus.

THALEROPIS IONIA.

(*Plate XX., Fig.* 4.)

Vanessa ionia, Eversm., Ent. Russ., v., p. 111, pl. 13, figs. 1, 2 (1851).

Apatura ammonia, Herr.-Schäff., Schmett. Eur., i., p. 6, *Nachtrag*, figs. 542–545 (1851).

This Butterfly is found on the southern shores of the Black Sea, at Amasia, &c. It measures about an inch and three quarters across the wings, which are of a yellowish-fulvous, sometimes varied with white and yellow. The base is broadly black, and there is a small eye at the hinder angles of all the wings. There are also some irregular basal spots. The under side of the hind-wings is blue or yellow, with a dark central band, not reaching quite across.

Although Eversmann's and Herrich-Schäffer's descriptions and figures were published in the same year, the official permit in the work of the former bears date January 10, whereas the parts of Herrich-Schäffer's work, in which the insect was included, are only the third and fifth of the eight parts published during 1851

EXOTIC GENERA ALLIED TO APATURA.

Various species of *Apatura*, brown, green, or blue, with orange-tawny, or brown and orange-tawny, markings, are found throughout Central Asia, as far as Japan, where insects almost identical with the European *A. ilia* and its varieties occur. Most of the other *Apaturæ* also unmistakably resemble those of Europe. Several species are found in Northern India, one of which, *A. namouna*, Doubleda[illegible]embles *A. iris*, but is of a brilliant blue in the male, in[illegible] being shot with purple, and has a satiny-white under[illegible]h an oblique tawny band towards the margins of the [illegible]. *chevana* (Moore) has a very similar under side, bu[illegible]n above (though with a purple gloss when fresh), with [illegible]narkings like an *Athyma*, to which genus Moore originally referred it. Most of the other Indian species are much smaller, and duller coloured; being dull brown, or only suffused with dull purple.

The genus *Chlorippe*, Boisduval, includes the South American species allied to *Apatura*. The hind-margin of the fore-wings is more concave, and the hind-wings are longer, and much narrowed to the anal angle, which is sometimes pointed, and is sometimes preceded by a slight tooth. The species are rather smaller than in *Apatura*, and the males are purple, with white or tawny spots towards the tips, or banded with blue, green, tawny, or white; the females are brown, with white bands or spots, and tawny markings; in some species the under surface of the hind-wings is of a most beautiful silvery white.

The North American representatives of *Apatura*, which are placed in the genus *Doxocopa*, Hübner, are brown and tawny Butterflies, measuring two or two and a half inches across the wings, with white spots on the fore-wings, and sometimes a sub-marginal row of spots on the hind-wings.

Returning to India, &c., we find several small but interesting genera allied to *Apatura*. *Eulacura*, Butler, is represented by *E. osteria* (Westwood), which is found in Malacca, Java, and Borneo. It measures two and a half inches across the wings, which are brown, with a bluish-white band in the male, not extending to the costa of the fore-wings. The female has a bluish-white sub-marginal line, and a broad and somewhat irregular band of bluish-white within it on the fore-wings. The under surface is bluish-white, varied with pale tawny lines and markings; towards the hinder angle of each wing is a well-marked white or tawny eye, with a black pupil. The fore-wings are much longer than in typical *Apatura*, the hind-margin being oblique as well as concave; the hind-wings are regularly curved and dentated. The female much resembles some species of *Euthalia* and *Tanaecia* in its style of colouring, but its shape and the eyes of the under side (which in the female are slightly visible above) will distinguish it.

Dichorragia, Butler, likewise somewhat resembles *Euthalia*. In the North Indian *D. nesimachus* (Boisduval) the wings are brown, with zig-zag grey and bluish-grey markings, and many large black spots The wings are broad, the fore-wings with the hind-margin only slightly oblique or concave, and the hind-wings rounded, dentated. and more strongly produced at the anal angle. It expands about three inches.

Castalia, Moore, is another genus, including species with longer fore-wings, deeply concave below the middle of the hind-margin, and with the hind-wings rounded and dentated.

The fore-wings are black, with bands of orange-tawny and white spots; the hind-wings are mostly orange-tawny with black veins. On the under surface this portion of the wing is divided by broader black veins and intermixed with white spaces; towards the base are some pale blue spots. The Butterflies measure about three inches across the wings.

Dilipa morgiana (Westwood) is another North Indian species, much resembling *Apatura* in shape and size, but with hairy eyes, and closed wing-cells. It is brown, with two oblique orange bands on the fore-wings, and a very broad one on the hind-wings; as in *Castalia*, there are no eyes towards the hinder angles of the wings.

The largest species of the *Apatura* group is *Apaturina erminea* (Cramer) from Amboina, which measures about four inches across the wings. The wings are longer than the hind-wings, with the hind-margin only slightly concave, and the hind-wings have a round slightly dentated hind-margin, and form a long broad, which is not contracted or pointed at the anal angle, more or less the case, at least, in the male, in most of the genera allied to *Apatura*. It is brownish-black above, broadly purplish-blue at the base, and with an oblique row of large pale yellow spots on the fore-wings; towards the anal angle of the hind-wings is a large eye, most distinct beneath. This genus also has closed wing-cells.

The last genus of this group which we shall notice is *Helcyra*, Felder, containing a group of white Butterflies found in the Himalayas and in Amboina, with broad black borders to the fore-wings and a few black spots scattered irregularly towards the margins of the wings. The wings are broad, the fore-wings short, with the hind-margin nearly straight, and the hind-wings are dentated, with an angular projection in the middle of the hind-margin.

GENUS PROTOGONIUS.

Protogonius, Hübner, Verz. bek. Schmett., p. 100 (1816); Westw., Gen. Diurn. Lepid., p. 313 (1850); Butl., P. Z. S., 1873, p. 773, 1875, i., p. 35; Schatz, Exot. Schmett., ii., p. 171 (1888).

The long narrow wings of this genus, and the distribution of

its colours, black, tawny, yellow, and white, give it much outward resemblance to one of the *Heliconiinæ*, or to *Lycorea*, or *Melinæa*, among the *Danainæ* and *Ithomiinæ;* but the wing-cells, closed by very slender rudimentary disco-cellular nervules, and the dentated wings, show it to be one of the true *Nymphalinæ*. The antennæ are rather short, and are produced into a long club, not pointed at the end. The fore-wings have an arched costa, and the hind-margin is only slightly oblique to the middle, where it throws out a strong tooth. Below this the hind-margin curves strongly to the hinder angle, and like that of the hind-wings, is strongly dentated. In the middle of the hind-margin is a moderately long spatulate tail.

There are a considerable number of forms of this genus, which were originally considered to belong to one variable species; but latterly they have been treated by Butler and others as distinct. They chiefly differ in varieties of pattern and arrangement of the various colours; but there is also some difference in the size and shape of the tooth on the hind-margin of the fore-wings, and in the length of the tooth at the anal angle of the hind-wings, which is scarcely marked in some forms, and becomes a strong sharp projection in others. They are all natives of Tropical America.

"Found flying near the borders of the forest, and settling on extended branches with its wings closed perpendicularly." (*Bates.*)

There is little doubt that the various species of *Protogonius* mimic those of *Lycorea* in their various localities. Thus *P. ochraceus*, Butler, from Trinidad, mimics *L. flavescens*, Kirby, from the same locality.

PROTOGONIUS FABIUS.

(*Plate XXV., Fig.* 2.)

Papilio fabius, Cramer, Pap. Exot., i., pl. 90, figs. C. D. (1776).

This curious Butterfly measures nearly four inches in expanse. The fore-wings have a rounded projection just below the apex, below which the hind-margin is concave and oblique, and at half the distance below the first prominence and the hinder angle, is a much stronger obtuse projection, below which the hind-margin is much more oblique to the hinder angle. The hind-wings are short, and much more strongly dentated than the fore-wings, and have a rather long obtuse tail in the middle of the hind-margin, and a slight pointed projection at the anal angle. The inner-margin forms a gutter to receive the abdomen, and is concave beyond to the anal angle. The fore-wings are black, the costa reddish-tawny nearly to the middle, and the lower part of the cell filled up with reddish-tawny nearly to the extremity; this forms the upper part of a large patch, which is continued obliquely towards the anal angle, near which its lower end is produced to a point. The outer side of this patch is slightly marked with yellow. Below the extremity of the reddish-tawny stripe on the costa, a broad band, divided into long spots by the nervures, irregular in outline on both sides, and with the last spot but one the longest, runs slightly obliquely nearly to the base of the tooth on the middle of the hind-margin. Above the lower end of this band is a row of four sub-marginal yellow spots running from the costa. The hind-wings are black, with a reddish-tawny band running from the base, and occupying most of the upper portion, but not extending much below the cell; the inner-margin is also tawny, shading into yellowish towards the body. There is also a sub-marginal row of four white spots, mostly linear, running from the anal angle to the root of the tail. On the under surface the prevailing colour is yellowish-grey, varied with large irregular blotches of purplish-brown towards the base and hinder angles of the wings, and with spaces thickly speckled with lighter brown beyond.

This species much resembles a *Lycorea* in the general arrangement of its colours, and very probably occurs in company with *Lycorea ceres*, figured by Cramer on the same plate, both insects being from Surinam.

This species differs from all the described members of the genus, except *P. hippona* (Fabricius; which appears to be the insect figured by Stoll, Suppl. Cram., pl. 2, figs. 1, a–d (1787); with its earlier stages), in the much less extension of the reddish colour on the hind-wings; in most of the other species it covers the whole surface nearly to the sub-marginal spots. But *P. hippona* differs in having only one or two sub-apical yellow spots on the fore-wings, and the yellow band much narrower; the wings are also much less dentated, and the tooth on the hind-margin of the fore-wings is shorter and more obtuse. Stoll's insect was probably from Surinam; there is a specimen of what appears to be the same species in the British Museum from Parā.

GENERA ALLIED TO PROTOGONIUS.

These form the *Anæa* group of Schatz and Röber, and are all confined to Tropical America. They are Butterflies of considerable size, generally measuring about three inches across the wings, and are adorned with bright colours. The genus *Anæa*, Hübner, itself is very numerous in species, which have a strong family likeness, though differing very much in the outline of the wings. The latter are broad, and the hind-margin of the fore-wings is sometimes nearly straight, or even slightly convex. The tip is frequently pointed, or even strongly hooked, in which case the hind-margin is often first concave, and then convex above the hinder angle, which is also sometimes hooked downwards, and followed by a concavity on the inner-margin. The hind-wings are ample, and the hind-margin is sometimes rounded and slightly dentated, with the anal

angle more or less prominent; but more frequently the wings are more or less angulated, with a tail at the outer angle.

Some of the species are pale coloured above, such as *A. electra* (Westwood), from Mexico, a straw-coloured Butterfly with black borders, and the hind-wings more or less tinged with tawny; the fore-wings are hooked, and the hind-wings have a spatulate tail, the anal angle also being produced into a short tail. But most of the species are black, generally blue, green, or purple at the base, and often crossed with blue bands beyond; in *A. cyanea* (Godman and Salvin), from Ecuador, the male, except on the black borders, is of the richest purple, with a broad blue sub-marginal band from the inner-margin of the hind-wings to the middle of the fore-wings, and two blue spots towards the outer half of the costa. The hind-margin of the fore-wings is oblique, and the tail of the hind-wings rather short and pointed.

Another very handsome species is *A. panariste* (Hewitson), from Bolivia, in which the black wings are richly glossed with deep blue, and there is a broad yellow space on the costa of the hind-wings. In shape it resembles *A. electra*, but the fore-wings are longer and more sickle-shaped.

Other species are red, often more or less glossed with purple, sometimes on the fore-wings only, and sometimes on all the wings.

The under sides are generally grey, ochreous, or brown, mottled with darker, and occasionally crossed by a dusky line. The Butterflies are forest insects of strong flight, and may be found settled on the trunks of trees, sucking the sap. They appear to represent the genus *Charaxes* in the New World, exhibiting the same variations in outline, and some of the species being very similarly coloured; but the correspondence is with African and not with Indian species, and is chiefly to be seen in some of the blue forms, such as *Charaxes ethalion*, Boisd., &c.

1. *Marpesia peleus.*
2. *Protogonius fabius.*

So far, however, *Anæa* has never been considered very closely allied to *Charaxes*, and whether future investigations will establish a closer affinity between them than outer resemblance, remains to be seen.

Hypna, Hübner, is a genus closely allied to *Anæa*, and, like it, is widely distributed through Tropical America, though it does not contain many species. The latter are closely allied, and were formerly all regarded as varieties of one and the same species. They expand three inches or more across the wings, which are of a glossy brown above, with a slight greenish shade; sometimes the hind-wings are reddish above. The fore-wings are falcate, though not very strongly so, and the hind-margin is slightly concave beneath. The hind-wings are long, angulated, and strongly dentated, with a moderately long spatulate tail at the outer angle. The lower part of the inner-margin is concave. There is a broad pale-yellow band running from before the middle of the costa of the fore-wings to the hinder angle, as in *Gynæcia*, which *Hypna* much resembles in general coloration above, though not in shape.

On the under side the wings are mottled with purplish-brown and dull green, and marked with metallic silvery spots. Bates describes these Butterflies as frequenting the borders of the forest, and settling on projecting branches of trees.

THE GENUS AGANISTHUS AND ITS ALLIES.

The species belonging to this group are not numerous, and are all Tropical American. They are large and robust in form and were formerly placed near *Charaxes*; but the discovery of the transformations of *Aganisthus* shows that they have strong affinities with the typical *Nymphalinæ*. They are probably an intermediate group, connecting the *Nymphalinæ* with the *Apaturinæ*

Aganisthus odius (Fabricius) is a very large brown Butterfly, measuring four or five inches across the wings. It is common throughout the whole of the warmer parts of America. The fore-wings have a strong projection on the hind-margin below the tip, below which the hind-margin is suddenly and deeply concave, and then more gradually, but strongly, convex above the hinder angle. The hind-wings are rounded, but gradually produced below into an obtuse point at the anal angle. The wings are black above, and [illegible] at the base; on the fore-wings the fulvous portion [illegible] wing sends out a broad obtuse projection a little ab[illegible] middle of the wing, nearly to the hind-margin. Befo[illegible]ip is a white spot. On the under surface the wings are u[illegible]sely, but not sharply banded with lighter and darker brown, and slightly shaded with green. The wing-cells are open. The larva is set with branching spines, and has two clavate horns on the head; the pupa is long, and laterally compressed, with horns on the back.

"It is an insect of extremely rapid flight. I have seen it only in open sunny places in the neighbourhood of towns." (*Bates.*)

Coea cadmus (Cramer) differs from *Aganisthus* by the tailed hind-wings, and the closed wing-cells. It is smaller and less robust than *A. odius*, with narrower wings, but is very similarly coloured. The fore-wings are less produced, and are of a deeper red at the base, but this colour ends more obtusely than in *A. odius* at two-thirds of their length; towards the tip are several white spots. The hind-wings are rounded and dentated, and there is a moderately long, slender, acute tail on the middle of the hind-margin. The under side is brown, with zig-zag black lines.

This species very greatly resembles *Pycina zamba* (Doubleday and Hewitson), which is found in Venezuela, but, in the latter species, the hind-wings are more reddish above, and

are without a tail. The under side is marbled and mottled as in *Pyrameis*, and Schatz and Röber consider it to be allied to that genus.

Megistanis (Westwood) is another genus closely allied to *Coea*, though with much superficial resemblance to *Charaxes*, from which it differs by its closed wing-cells, and the short fork formed by the fourth and fifth sub-costal nervures on the fore-wings. The species measure about three inches across the wings, which are black with white spots towards the tip, and have generally a broad blue or orange band running from the middle of the fore-wings to the anal angle of the hind-wings; nearer the costa of the fore-wings are one or two large spots corresponding to the band. The under surface is light blue or buff with black lines and spots. The Butterflies measure about four inches across the wings; the fore-wings are slightly emarginate, and the hind-wings strongly dentated, with a short pointed tail at the end of the upper median nervule. They have a wild and rapid flight, and are fond of settling on damp mud.

GENUS CHARAXES.

Charaxes, Ochsenheimer, Schmett. Eur., iv., p. 18 (1816); Butler, P. Z. S., 1865, p. 623; Schatz, Exot. Schmett., ii., p. 175 (1888).

Nymphalis, Latr., Hist. Nat. Crust. Ins., xiv., p. 82 (1805); id. Enc. Méth., ix., pp. 10, 329 (1819–23); Westw., Gen. Diurn. Lepid., p. 306 (1850).

Type, *Charaxes jasius* (Linn.)

This genus is somewhat allied to *Apatura*, but the body and antennæ are much thicker, and the latter gradually thickened; the fore-wings have the costa strongly arched, and the hind-margin deeply concave, and the hind-wings are generally provided with two tails, varying in length and shape.

The larvæ have generally four horns on the head, and a bifid tail.

This genus contains a considerable number of Indian, African, and Australian species; they are insects of considerable but not usually of very large size, about three or four inches being the usual expanse. One species only is European; it is found on the shores of the Mediterranean, and is probably derived from an Abyssinian species which greatly resembles it. It may have straggled down the Nile in former times, and then have become modified in the Mediterranean Sub-region; but neither the Abyssinian nor the European species is found in Lower Egypt at the present day.

With few exceptions, the Indian and Australian species are tawny, pale green, or pale yellow, with black borders; or are black, more or less broadly banded with the paler colours.

The species of this genus have a very lofty and powerful flight, and are very difficult to capture. They may sometimes be attracted, like other high-flying Butterflies, by strongly-smelling substances, and sometimes they suck the sap exuding from trees. They have also a habit of frequenting the same twig, and returning to it after a longer or shorter flight. Some species have a very extensive range in Africa, being met with from Abyssinia to the West Coast, and to Natal, while others are much more restricted in their range. Some, such as *C. eupale* (Drury), which is one of the smaller species, are remarkable for the unusual character of their colouring, which is light green in the species just mentioned; but others, such as the European *C. jasius* and its allies, are distinguished by the beautiful patterns of the under surface. They may be divided into a considerable number of small groups, which some authors consider to be of generic value.

In some species, as in *C. jasius*, the sexes are nearly alike, but in others they are very dissimilar both in form and colouring.

Charaxes jasius.

Mr. Trimen, in his "Rhopalocera Africæ Australis" (p. 166), makes the following remarks on the habits of the South African species of *Charaxes:* "All, as far as is known at present, are inhabitants of woods, where they delight to settle on the stems or lofty twigs of timber-trees, frequently darting from their resting-places, and sporting about with a rapidity which might be inferred from their massive thorax, and strong, cleanly-cut wings. Again and again, even when roughly scared from their seat, will they return to the same position. They do not appear to relish the honey of flowers, but the moisture that exudes from the bark of trees forms their favourite food. Occasionally, too, they are attracted to earth by some damp substance, and the more strongly-scented such substance be, the more likely are they to settle on it. The males are always the higher, more rapid, and frequent flyers, and females are consequently the oftener captured, though anything but slow in their movements." However, in his recently-published "South African Butterflies," he mentions that the species of *Charaxes* may sometimes be attracted by honey, or by the sweet compound called "sugar," which English entomologists use to attract Moths; and that many of the smaller species are in the habit of frequenting flowers.

THE PASHA WITH TWO TAILS. CHARAXES JASIUS.

(*Plate XXVI.*)

Papilio jasius, Linn., Syst. Nat. (xii.), i. (2), *errata* (1767); Drury, Ill. Exot. Ins., i., pl. 1, fig. 1 (1773); Esper, Schmett., i. (2), p. 29, pl. 99, figs. 1, 2, p. 61, pl. 104, figs. 2–8 (1790?).

Papilio jason, Linn., Syst. Nat. (xii.), i. (2), p. 749, no. 26 (1767); nec Syst. Nat. (x.) i., p. 485, no. 171 (1758); Cramer, Pap. Exot., ii., pl. 186, figs. A. B. (1777); iv., pl. 329, figs. A. B (1780).

Charaxes jasius, Kirby, Eur. Butterflies and Moths, p. 25, pl. 11, fig. 4 (1878); Lang, Butterflies Eur., p. 154, pl. 34, fig. 1, pl. 36, fig. 1 (1882).

This Butterfly is the only European representative of the genus to which it belongs. It is found in most of the countries bordering on the Mediterranean, France, Italy, Greece, Algeria, &c. In Southern France it is perhaps most abundant in the Isles of Hyères, though it occurs as far north as Lyons.

It measures from two and a half to three and a half inches across the wings, which are of a silky brown with a slight reddish tinge. All the wings have a marginal yellow border, cut by the nervures, and shading into orange towards the tip of the fore-wings, and into yellowish-green at the anal angle of the hind-wings. On the fore-wings the costa is yellowish-red, and there is a marginal row of orange spots running from the costa, sometimes represented on the hind-wings by a spot on the costa. Within the band there is generally a row of four small blue spots towards the anal angle of the hind-wings. The yellow band of the hind-wings is narrowly bordered with black, and the tails are also black.

On the under side, the wings, from the base to beyond the middle, are of a deep purplish-red colour, with many stripes and spots of olive-brown bordered with white; this is followed by a bluish-white band, broader on the hind-wings than on the fore-wings, where it is sometimes only slightly marked; outside this, on the fore-wings, is a row of orange spots bordered outside with black, and separated by a grey space from the orange hind-margin; on the hind-wings the white band is followed by a series of dark red spots, beyond which the wing is orange nearly to the hind-margin, which is more narrowly edged with black than on the upper side. The inner side of this orange space is more or less clouded with black;

and towards the anal angle is a row of blue spots, paler than above, and partially bordered with black.

"The caterpillar, which in its early stage is green, becomes afterwards of a yellowish hue, and its skin is, as it were, shagreened and transversely plaited. Its head is singularly armed with four vertical yellow horns, tipped with red, of which the two intermediate are the longest. A yellow line passes along each side of the body in the region of the stigmata, and the back is marked with four indistinct orange spots. The true feet are black, the membranous ones green. It feeds on the leaves of the strawberry-tree (*Arbutus unedo*), and never eats except during the night. Its habits are very lethargic. During daytime it remains fixed and motionless on its favourite plant, which it resembles in colour, and thus escapes observation. The chrysalis is smooth, thick, carinated, and of a coriaceous texture, the colour pale green. Two broods or flights of the perfect insect are produced each year, the first in June, the second in September. The caterpillars of the autumnal brood survive the winter and are not transformed into chrysalids till the ensuing May. The perfect insects are then produced in about fifteen days. These speedily deposit their eggs, which are hatched in June, and after three months occupied in the usual transformations, the second flight appears in September, and continues the race in the manner above-mentioned. In many parts of France the Butterfly is named the '*Pasha with Two Tails.*'" *

Further particulars respecting the habits of this interesting Butterfly, from the observations of Mr. de Vismes Kane, will be found in my "European Butterflies and Moths" (pp. 23, 24), to which I must refer the reader. The French entomologists often use rotten cheese as a bait to attract this and other high flying Butterflies within reach.

* Wilson's "Illustrations of Zoology," fol. 27.

C. jasius is closely allied to *C. epijasius* (Reiche), an Abyssinian species, which is chiefly distinguished from it by possessing a large patch of pale blue on the upper side of the hind-wings.

In Drury's "Illustrations of Exotic Entomology," vol. i., p. 2, and vol. iii., p. 42 (Westwood's edition), will be found an account of the habits of *C. castor* (Cramer), a common West African species, which much resembles *C. jasius* beneath, but which is tawny on the upper side, with broad brown borders, and has much shorter tails on the hind-wings. It was first brought from Sierra Leone by Smeathman, a naturalist who visited that place in the last century, and whose observations on the insects which he collected are of permanent interest and value. "It flies in the heat of the day with amazing rapidity, and seldom descends within eight feet of the ground. It glances from the prominent branches of one tree to those of another as swiftly as a Swallow, and turns its head about instantly to the glade or path, and will not suffer any person to approach within a striking distance of it, but darts away on the least motion of the body. If the collector exert his patience, it will at last become more familiar and careless, and is then to be caught upon some particular branch, to which it will appear more attached than to another." These observations have been erroneously supposed to apply to *Papilio antimachus* (Drury) (cf. vol. iii., p. 2).

CHARAXES XIPHARES.

Papilio xiphares, Cramer, Pap. Exot., iv., pl. 377, figs. A. B. (1782).

Papilio thurius, Godart, Encycl. Méth., ix., p. 354, no. 15 (1823).

Nymphalis xiphares, Godart, Encycl. Méth., ix., p. 357, no. 25 (1823); Trimen, Rhop. Afr. Austr., p. 167 (1866).

Charaxes xiphares, Trimen, S. Afr. Butterflies, i., p. 346 (1887).

Papilio thyestes, Stoll Suppl. Cram., pl. 32, figs. 2, 2 B. (1790).

This is a handsome South African Butterfly, measuring from three and a half to four and a half inches across the wings.

The male is blue-black above, with rows of blue and white spots on the fore-wings, and there is a broad blue band across the hind-wings, which have two rows of sub-marginal lunules, and two short tails. In the female the spots are larger and whiter, and the blue band is replaced by a yellow one. The under surface is light brown or grey, with numerous blue and white lines, with a white band, less marked in the male, and a sub-marginal row of black lunules bordered with yellow.

Mr. Trimen (Rhop. Afr. Austr., p. 170) gives the following account of the habits of this conspicuous species: "Their favourite haunts are the open spots on, or near, the outskirts of a wood, where they settle on the bark or projecting twigs of the trees, frequently glancing off, suddenly disappearing among or over the opposite trees, and as suddenly returning to the spot so abruptly left. I have several times seen three or four specimens together, settled high up on a lofty tree-stem, busily imbibing the moist exudations from its bark. When so engaged, they walk over a little space with much importance of action, contemptuously snapping their glossy wings at impertinent *Diptera* and other insects, who presume to share their repast. I have sometimes suddenly roused the female from quite a low bush, when she darted up and away with such velocity that a single vain stroke of the net was the most I ever had an opportunity of making. One day, however, this single instinctive sweep of the net was successful."

CHARAXES TIRIDATES.

(*Plate XXVII., Figs.* 1, 2.)

Papilio tiridates, Cramer, Pap. Exot., ii., pl. 161, figs. A. B. (1777); Drury, Ill. Exot. Ent., iii., pl. 23, figs. 1, 2 (1782).
Nymphalis tiridates, Godart., Enc. Méth., ix., p. 354, no. 14 (1823); Trimen, Rhop. Afr. Austr., p. 172 (1866).
Charaxes tiridates, Staud. Exot. Schmett., i., p. 169, pl. 59 (1885).
♀ *Papilio marica*, Fabr., Ent. Syst., iii. (1), p. 113, no. 346, (1793); Donov., Nat. Rep., ii., pl. 37 (1824).

This species was originally described by Cramer as from Java and Amboina; but although he corrected the error in his "Errata," giving the locality as Guinea, subsequent authors perpetuated it, even as late as Westwood in his edition of Drury's "Illustrations of Exotic Entomology," published in 1837, and Duncan in the volume on Exotic Butterflies in the "Naturalist's Library" 1840. Westwood, indeed, adds the equally erroneous locality of Rio Janeiro, on the authority of a correspondent of Drury's. Since then, however, the insect has become well known as a native of West Africa, and was also described as inhabiting South Africa by Mr. Trimen on Boisduval's authority; but as he has excluded it from his later works, it is to be presumed that its reputed occurrence in South Africa is more than doubtful.

The male measures about four inches across the wings, which are of a very deep blue-black, with brown nervures; and there is a double row of blue spots towards the margins of all the wings. The incisions, and a sub-marginal row of lunules on the hind-wings, are yellowish. On the under surface, the wings are of a brownish grey, somewhat glossy, and are ornamented with black streaks and spots edged with blue towards the base, more or less bordered with yellow, and

1. 2. [illegible]ces tiridates.
[illegible] etheocles.

1. 2. Charaxes tiridates.
" " etheocles.

followed by rows of more or less continuous yellowish spots partly bordered with blue. Towards the hinder angle of the fore-wings are two blue lunules, bordered with black and yellow, and on the hind-wings is a sub-marginal row of violet ocellated spots, preceded and followed by a row of yellow lunules. The tails are rather short and slender, the first longest. The body is dark brown above, with four white spots on the head; beneath it is yellowish. The antennæ are black, with the palpi yellow beneath.

The female, described by Fabricius under the name of *Papilio marica*, and correctly stated by him to come from Africa, is brown above, with a white band and white spots on the fore-wings, and some blue and white spots towards the margins of the hind-wings.

CHARAXES ETHEOCLES.

(*Plate XXVII., Fig.* 3.)

Papilio etheocles, Cram., Pap. Exot., ii., pl. 119, figs. D. E. (1777).

Nymphalis etheocles, Godart., Enc. Méth., ix., p. 355, no. 17 (1823).

The female of this Butterfly was first brought from Sierra Leone. It expands about three and a half inches, and is of a shining bluish colour above, while across the middle of the wings runs a broad white band, with greenish reflections. On the fore-wings this band is divided into spots, and commences on the costa with a row of four small ones in a line with the outer limit of the band. At and above the end of the cell, beyond the level of the inner edge of the band, is another row of three small spots, and there is a detached one in the upper part of the cell at about two-thirds of its length. The portion of the hind-wings beyond the band is blackish, bordered outside

with white, and then by nearly connected green sub-marginal lunules, the hinder angle of the fore-wings being also marked with a green spot. Towards the anal angle of the hind-wings are two black spots.

The under side is of a pale coffee-brown, with some short blue lines and streaks towards the base, bordered with black. On the fore-wings are three round black spots in blue rings near the base, and the two lowest white spots of the band are produced nearly to the hind-margin, and are each marked at three-quarters of their length with a large black spot. On the hind-wings the lower part of the white band is bordered outside with green, and then, much more extensively, with blackish, and the white lunules are bordered outside with blue, most broadly towards the anal angle. The space between these lunules and the anal angle, including the innermost tail, which is the shortest, and the area reaching nearly to the root of the other tail, is green, with four prominent black spots, two of which are close together near the anal angle.

The male, as in the numerous closely-allied species of this group, is probably smaller, of a deep velvety black, with some detached blue spots on the fore-wings, and some slight white or greenish markings towards the hind-margins of the hind-wings. There is no specimen exactly resembling Cramer's figure, from which the one in our plate is copied, in the collection of the British Museum; and Drury ("Illustrations of Exotic Entomology," iii., pl. 10) has figured a different, and not very closely allied, West African species of *Charaxes*, *C. etesipe* (Godart), under the name of *Papilio etheocles*.

GENERA ALLIED TO CHARAXES.

Ethiopian Region.

The genus *Palla*, Hübner, is so closely allied to *Charaxes* that Mr. Trimen does not consider it worthy of separation

The species expand three or four inches across the wings, which are broad, the fore-wings not much longer than the hind-wings, and the latter more square than is usually the case in *Charaxes*, with a strong tail at the outer angle. They are black, with white or tawny markings, which may extend from the base to the middle of the wing, followed by sub-marginal rows of tawny spots, as in *P. varanes* (Cramer), or may consist of transverse bands across both wings, varying in width. *P. varanes* is common in most parts of Africa, and is described by Mr. Trimen as less rapid in its flight than the typical species of *Charaxes*, and as frequently descending to sport about trees and bushes. It is also fond of the sap exuding from trunks of trees. The pupa is remarkable for possessing two pairs of small yellowish black-tipped tubercles on the anal pedicel, and two on the ventral surface, close to the pedicel; the head is bifid.

Another African genus included by many entomologists with *Charaxes* is *Monura*, Mabille, which differs much more in shape from typical *Charaxes* than does *Palla*. *M. zingha* (Cramer) is a well-known West African Butterfly, expanding about three inches. The fore-wings have the hind-margin hardly concave, but the hind-wings are at first rounded and dentated, and then curved outwards to form a broad lobe at the anal angle, with a projecting tooth on the outer side. The wings are black, broadly red at the base, with this colour running up nearly to the tip of the fore-wings. The wings are black or buff beneath, with black spots at the base, blue spots in the middle and towards the anal angle of the hind-wings, and the hinder half of the fore-wings is red.

The genus *Euxanthe*, Hübner, which is confined to Africa and Madagascar, has no very near allies, but is considered by Schatz and Röber to be allied to *Charaxes*, which it resembles in neuration, but not in shape. These Butterflies measure four

inches in expanse, and have very broad, rounded, hardly denticulated wings, the fore-wings being hardly longer than the hind-wings. The species are black, with green or yellow transverse markings, and sometimes white spots; more or less of the centre of the hind-wings is usually green.

Indian and Austro-Malayan Regions.

To these regions belongs the small genus *Prothoe*, Hübner, the type of which, *P. franckii* (Godart), is about three inches in expanse, with broad short wings, and the hind-margin of the fore-wings nearly straight, while the hind-wings are angulated, and produced into a short broad obtuse tail at the outer angle. The Butterfly, which is found in Java, is black, with a broad oblique white band edged with blue on the fore-wings; towards the tip are some white spots. The under-side is brown, varied with grey, and, on the hind-wings, with greenish: it is marked with black spots and zig-zag lines. There are several closely allied forms in Malacca, &c., with the band blue, sometimes without any white admixture. In *P. australis* (Guérin), and its allies, which are found in New Guinea and the Moluccas, the hind-wings are concave below the middle, and produced into a short broad lobe, but are hardly sub-caudate. These Papuan species of *Prothoe* are black Butterflies, rather larger than *P. franckii*, with very broad white or pale yellow bands on the hind-wings, and often on part of the fore-wings likewise.

The largest and most beautiful species is *P. calydonia*, Hewitson. It is more than five inches in expanse, and is found in Malacca and Borneo. It is black, with the base and hinder half of the fore-wings primrose-yellow nearly to the margins, where the colour ends in a zig-zag outline; nearer the tip is an oblique row of spots of the same colour. The hind-wings are bluish, shading into primrose outside, with a broad black border; the outer angle forms a large rounded lobe. The under surface is black and brick-red, varied with primrose,

and in smaller proportions, with white, flesh-colour, blue, &c. It is a rare insect; the first specimen captured by Dr. Wallace had settled on dung, and it was twelve years before a second was brought to England. Hewitson considered it one of the most beautiful species with which he was acquainted.

Neotropical Region.

The genus *Zaretes*, Hübner, is remarkable for the dead-leaf pattern of the under surface of the wings, which is more pronounced than in any other Tropical American Butterflies. The species are of moderate size, generally about two inches and a half in expanse. The fore-wings are pointed, with the hind-margin, and the outer part of the inner-margin concave; the hind-wings are produced into a short tail at the anal angle. The species vary from pale ochreous to reddish-fulvous, and there are often two transparent spots on the fore-wings. The few closely-allied species are common throughout Tropical America, inhabiting thinned parts of the forest.

Cœnophlebia archidona (Hewitson), from Archidona in New Granada, is a much larger Butterfly, exceeding four inches in expanse. The fore-wings are extremely falcate, but otherwise unusually regular in outline, not being concave or dentated; the anal angle of the hind-wings is almost rectangular. The wings are of a rich tawny above, with brown or black borders, not sharply defined; the under side is brown, with tawny mottlings and silvery spots, and the mid-rib of a leaf-pattern, running beyond the middle of the hind-wings to the tip of the fore-wings; outside it are sometimes side-ribs of the leaf.

Siderone, Hübner, has much resemblance to *Zaretes*, especially in size, shape, and the more or less developed tail at the anal angle of the hind-wings. The species are about three inches, or rather less, in expanse. The fore-wings are but slightly pointed at the tip, and the hind-margin is rounded,

and only concave, if at all, at the hinder angle. They differ, however, very much from *Siderone* in colour, being black, sometimes glossed with purple, with a great part of the fore-wings from the base filled up with brilliant scarlet, of the same shade as in *Catagramma* or *Agrias*, from which the shape of the wings and the different character of the under side will at once distinguish them. This scarlet patch may be confined to part of the basal region, or it may extend over a great part of the wing; in the latter case, it is sometimes partly interrupted, and there is generally a red blotch on the costa of the hind-wings also. The females have the scarlet portion of the wings replaced with orange-tawny. The under side is dark brown, varied with reddish, but without sharply-defined markings.

After *Siderone*, we may consider *Agrias*, Doubleday and Hewitson, to which belong the most gorgeously coloured of the *Nymphalinæ* of the New World. They much resemble gigantic Butterflies of the genera *Catagramma* or *Callithea*, but are much more robust, and expand three or four inches; and they generally inhabit localities where these much smaller Butterflies are also found. The fore-wings are broad, hardly concave, and the hind-wings rounded, and but slightly denticulated, and scarcely, if at all, angulated in the middle, or produced at the anal angle. On the hind-wings of the male there is always a conspicuous tuft of yellow hair near the inner margin.

Some of the species are black, often suffused with rich purple, and the greater part of the fore-wings, except at the tip, is of a brilliant scarlet. The under side of the hind-wings is generally more or less yellow, variously marked with undulating black lines, and often with black spots towards the base on a bluish ground; but in all the species of the genus there is a sub-marginal row of moderate-sized round black spots, sometimes connected, and generally with large white or

bluish-white pupils. Other species are of a rich purple above, either with a nearly marginal pale green band, or with an orange space instead of a green one at the base of the fore-wings. In these the under side of the hind-wings is green, with black spots and lines towards the base (except when the basal half of the wings is red or yellow). One of the handsomest species is the newly-discovered *A. narcissus*, Staudinger, from Cayenne, which is marked very like a *Batesia*, being of a rich purplish-blue, with a broad oblique scarlet band on the fore-wings.

These magnificent Butterflies are most abundant on the western side of North America, towards the head-waters of the Amazons. They are insects of powerful flight, usually settling on trees. Bates has given a graphic account of the habits of his *A. sardanapalus*, a brilliant blue Butterfly, with the fore-wings scarlet for two-thirds of the length from the base. "I met with it," he says, "at different points of the Upper Amazons; always in sunny openings in the primeval forests, in hot gloomy weather between the dry and the wet season. Its evolutions on the wing are similar to those of the *Preponæ*, and it is utterly impossible to capture it, except when settled. The first examples I saw were attracted by a sweet sap exuding from the trunk of a felled tree, where a large number of Cetoniade Coleoptera were daily congregated. A dense crowd of other handsome Butterflies were assembled on the same tree—*Preponæ*, *Paphiæ* [*Anææ*], *Siderones*, *Gynæciæ*, *Ectimæ*, and others; but the frequent shifting of the eager creatures had rendered the gorgeous *Agriades* unusually wary, so that I was unable to capture them. When found alone, settled on ordure on the pathway, they were less difficult to secure; but it was only on three or four occasions, during as many years, that I was so lucky as to find the species in such situations."

These Butterflies are always highly prized by collectors both

for their beauty and their rarity, the latter being due to the difficulty of obtaining them, even in the distant countries where they are found.

Among the largest and most conspicuous of the Tropical American Butterflies are those belonging to the genus *Prepona*, Boisduval. They are very robust insects, measuring four inches across the wings, which are broad and dentated, with the tip of the fore-wings much produced, but not falcate, the hind-margin being oblique and then nearly straight below; near the inner-margin of the hind-wings of the males stands a yellow tuft of stiff hair, as in *Agrias*. The wings are black, and are generally crossed by a broad blue or greenish-blue band, often interrupted below the costa of the fore-wings. In some species the whole of the wings is suffused with rich purple; in others the blue band is confined to the hind-wings, and is reduced to a blue blotch. The most beautiful species is *P. præneste*, Hewitson, from New Granada, which might easily be mistaken for an *Agrias*, but for the much broader fore-wings with the hind-margin concave. It is black, suffused with rich purple, and with a sub-marginal row of scarlet spots. From the base of the fore-wings runs a scarlet band, narrowly continued along the costa for three-fourths of its length, but, beyond the cell, continued in a broad curve to the band of spots at a point opposite the middle of the hind-margin. On the under side the *Preponæ* are varied with different shades of brown and grey; sometimes there is a transverse black or white line, and very frequently a number of short irregular zig-zag lines towards the base. On the hind-wings beneath there is either a sub-marginal row of small eyes between the nervures, or two larger eyes, one towards the tip, and the other towards the anal angle; the latter is sometimes visible above. The larva and pupa resemble those of *Apatura;* and notwithstanding the strong and rapid flight of the Butterflies, they are

not difficult to capture, as they have the habit of settling on projecting branches of trees, and are not easily alarmed.

Polygrapha, Schatz, is a new genus which has been formed for a handsome Butterfly from Ecuador, described by Salvin and Godman as *Paphia cyanea*. It measures nearly three inches across the wings, which are much like those of a *Charaxes* in shape. The fore-wings are pointed, with the hind-margin oblique, but very slightly concave, and the hind-wings with the hind-margin gradually curved, obtuse at the anal angle, and with a moderately long slender pointed tail below the middle of the hind-margin. The wings are of a rich purple, with black borders, and are crossed by a paler blue band running from the inner-margin of the hind-wings to the middle of the fore-wings, and there are two detached blue spots on the fore-wings opposite the outer half of the costa. The under side is brown or grey, irrorated with black, and with the hind-margin of the hind-wings yellowish-green, on which stands a row of small black spots surmounted with blue.

SUB-FAMILY VII. MORPHINÆ.

Egg—Globular, translucent, hard, not so high as wide, smooth, or obscurely faceted.

Larva.—Smooth or hairy, with a forked tail, and generally with a bifid head.

Pupa.—Stout, oval, with a bifid head.

Imago.—Of large or very large size; palpi slender, and wings broad, generally rounded and entire, or scalloped; fore-wings sometimes long; hind-wings sometimes produced into a lobe, but never tailed; almost always with large ocellated spots beneath. Prevailing colours blue above, varying from almost white to the most brillant sky-blue; or marked with white, brown, and

tawny. Cells of the fore-wings closed, and those of the hind-wings open.

Range.—The typical genus, *Morpho*, is entirely confined to Tropical America, but there are about a dozen other genera of the Sub-family inhabiting various parts of the Indo-Malayan and Austro-Malayan Regions; but no species is yet known from Africa, Madagascar, or Australia; though it is very probable that one or more species of the curious genus *Tenaris*, Hübner, which is well represented in New Guinea, may also inhabit Northern Australia. These are white Butterflies, more or less varied with pale brown, measuring about three or four inches across the wings, and with two very large black blue-pupilled eyes in brown and yellow rings on at least the under side of each hind-wing.

Habits.—The long-winged species of *Morpho* have a very lofty sailing flight, which renders their capture a matter of great difficulty in a forest country. Those with shorter and broader wings have a lower flight through the forest glades, and settle occasionally on leaves or ripe fruit. In the mountains of New Granada and Ecuador, they are captured with long nets among the precipices, and collectors are sometimes let down by ropes to the ledges which they frequent. *Amathusia phidippus* (Linn.), a large brown East Indian species, with the hind-wings much produced, is said to appear about sunset.

GENUS MORPHO.

Morpho, Fabricius in Illiger, Mag. Insekt., vi., p. 280 (1807); Latr., Enc. Méth., ix., pp. 11, 435 (1819–23); Westw., Gen. Diurn. Lepid., p. 337 (1851); Schatz, Exot. Schmett., ii., p. 182 (1889).

Type, *Morpho achilles* (Cramer).

The genus *Morpho*, as already stated, though the type of

1. *Morpho adonis.*

2. *Caligo ilioneus.*

the family, is the only one found in Tropical America; but it varies so much in the shape of the wings and in other characters that it might easily be divided into several genera, if it were worth while to do so. The antennæ are long, slender, and gradually clubbed, the wings ample, sometimes long, and sometimes broad, and there is a conspicuous spur at the base of the median nervure of the fore-wings. There are also two subcostal nervules branching before the end of the cell. In the Old World genera there is no median spur, and only one subcostal branch before the end of the cell

We have figured two species of this genus, representing two different groups.

MORPHO ADONIS.

(*Plate XXVIII., Fig.* 1.)

Papilio adonis, Cramer, Pap. Exot., i., pl. 61, figs. A. B. (1777).

Morpho adonis, Godart., Encycl. Méth., ix., p. 439, no. 3 (1823); Distant, Trans. Ent. Soc Lond., 1881, p. 397, pl. 20.

Papilo marcus, Schall., Naturforscher, xxi., p. 174, no. 4, pl. 4, figs. 1, 2 (1785).

This species inhabits Surinam and British Guiana, and measures from three and a half to five inches across the wings, which, in the male, are of a rich sky-blue above, and of a pearly-grey beneath, varied with light brown, with two or three rather small eye-spots. The female is brown, with a broad white band. It is a rare insect in collections, though a very similar species, *M. æga*, Hübner, which inhabits Brazil, is common.

MORPHO ACHILLES.

(*Plate XXIX.*)

Papilio achilles, Linn., Syst. Nat. (x.), i., p. 463, no. 32 (1758); id. Mus. Ludov. Ulr., p. 211 (1764); Clerck, Icones, pl. 24, fig. 2 (1764).

This species, the type of the genus, represents the shorter-winged species of the genus *Morpho*. It is black, with a broad blue band across the middle of both wings, and has two rows of white spots, converging hindwards, beyond the band of the fore-wings. Beneath, the wings are ornamented with eye-spots, which in the variety figured are produced towards the hind-margin. The hind-wings are also more or less ornamented with white and greenish markings. *M. achilles* is a common Brazilian species; and there are many others belonging to the same group, but differing in the amount of blue on the wings. Some of these species are wholly blue, except on the borders of the wings.

In the broad-winged species of *Morpho* the females often much resemble the males; but in those with longer and more pointed wings, they are often very dissimilar, as we have noticed under *M. adonis*.

One of the largest Butterflies of South America is *M. hecuba* (Linn.), from Surinam; it is brown and tawny in colour, and measures seven or eight inches across the wings. The brightest and richest blue of all is found in the males of *Morpho rhetenor* (Cramer), from Brazil, and *M. cypris*, Westwood, from New Granada; the latter has a broad white band across the blue. *M. rhetenor* is common on the Amazons, where the Butterflies may be seen flapping their wings in the sun half a mile away; but their flight is so lofty that Bates was only able to obtain two specimens in eleven years.

Another very beautiful species is *M. sulkowskyi*, Kollar; it is one of the smaller ones, only measuring about three or four inches across the wings, and is of a light iridescent blue, changing into delicate pinks and yellows according to the position in which it is seen. These iridescent colours, so remarkable in some Butterflies, are due to the refraction of light from the edges of the scales.

Another beautiful group is represented by *M. laertes* (Drury) and its allies. These are of a very delicate pale blue or green, sometimes almost white, and have a continuous row of small eyes on the under side of the hind-wings.

Some of the species of *Morpho* have two dissimilar forms of female; thus *Morpho cypris*, referred to above, has a blue female like the male, but with a broader white band, and also a brown and tawny female, quite unlike its partner.

ORIENTAL GENERA ALLIED TO MORPHO.

The largest species belong to the genus *Stichophthalma*, Felder, and measure four or five inches across the wings, which are very broad, with the hind-margins rounded and dentated; they have a row of moderate-sized ocelli, bordered within by a pale band, on the under side of the wings. One of them, *S. howqua* (Westwood), a Chinese species, is yellowish-tawny above, with a double row of black sagittate sub-marginal black spots; and *S. camadeva* (Westwood), which is common in the Himalayas, has bluish-white fore-wings, with marginal black markings, nearly as in *S. howqua;* the base is rusty-red, and that of the hind-wings more broadly so, shading outside into blackish, crossed by two sub-marginal rows of nearly connected triangular and lunular bluish-white spots.

In *Thaumantias*, Hübner, the fore-wings are more pointed above, and the hind-margin is nearly straight; they are brown. generally either more or less blue at the base, or with a broad blue or yellowish-white band on the fore-wings, and sometimes with a large mass of orange on the lower part of the hind-wings towards the anal angle, and the tip of the hind-wings more narrowly bordered with orange.

Among the smaller species of *Morphinæ* are those belonging to the genus *Clerome*, Westwood, some of which do not much exceed two inches in expanse. They are usually of a tawny

colour above, with short broad fore-wings and rounded hind-wings; the under surface is generally more or less ocellated, sometimes with a large eye at the tip of the fore-wings, and two on the hind-wings, and sometimes with merely a row of pale dots across the wings.

In *Amathusia*, Fabr., and *Zeuxidia*, Hübner (large brown Butterflies, measuring about four inches across the wings, and sometimes ornamented with large bands or masses of blue on the wings of the males, and with orange-tawny or white markings on the females), the hind-wings are more or less produced at the anal angle.

The species of *Discophora*, Boisd., are brown Butterflies, sometimes with a purplish lustre, measuring about three inches across the wings, with white, bluish-white, or tawny transverse bands and rows of spots; the under side is mottled with brown and dull yellow. In the males the hind-wings are rounded, and in the female they are angulated in the middle of the hind-margin.

The genus *Enispe*, Westwood, somewhat resembles *Cirrhochroa* in its markings, but the species are much larger and more robust, with longer hind-wings produced at the anal angle. They are of a rich fulvous, with brown zig-zag lines and spots. The innermost line is straighter than the others, and is visible on both surfaces of the wings, and beyond it; on the under surface, which is yellowish, some traces of small ocellated spots are perceptible.

Of the genera of Eastern *Morphinæ* which we have noticed, *Thaumantias* and *Enispe* are not found in the islands, but *Tenaris* is a purely insular genus; otherwise the genera are about equally well represented on the Asiatic continent and in the islands. In some genera the males have conspicuous tufts of hair on the upper surface of the hind-wings, most frequently at the base; but in *Zeuxidia* there are also two large tufts in the cell, and sometimes another towards the inner-margin, while

Morpho achilles

across the wings; the fore-wings are arched, and not longer than the hind-wings, which are very broad. In colour it is dark brown, with a connected row of pale sulphur-yellow spots on the fore-wings, and a very broad orange border to the hind-wings. It is found at Rio Janeiro, but is not a very common insect.

The largest species of the Sub-family belong to the

GENUS CALIGO.

Caligo, Hübner, Verz. bek. Schmett., p. 51 (1816); Westw., Gen. Diurn. Lep., p. 340 (1851); Schatz, Exot. Schmett., ii., p. 193 (1889).

Type, *C. eurylochus* (Cramer).

The species of *Caligo* are large broad-winged insects resembling *Morpho*, but they may be at once distinguished, not only from *Morpho*, but from all other Butterflies, by the huge black eye, with a bluish or whitish crescent in the middle, and a broad yellow outer ring, which is placed on the under surface of each hind-wing, a little below the middle. The wings are generally dull blue or buff, with broad black borders, and one or two have orange markings towards the tip of the fore-wings, or on the hind-margin of the hind-wings.

CALIGO EURYLOCHUS.

Papilio eurylochus, Cramer, Pap. Exot., i., pl. 33 A., 34 A. (1777).

Morpho eurylochus, Godart, Enc. Méth., ix., p. 448, no. 24 (1823).

A large South American Butterfly, measuring six or seven inches across the wings; the fore-wings are brown, with a pale sub-marginal stripe, and some round black spots, bordered within with white, both above and below, towards the tips; the

base of all the wings is blue, and the outer part of the hind-wings is blue-black. On the under side of the hind-wings is a very large black eye, containing a white crescent, and surrounded by broad rings of tawny and brown. A little above this is a small kidney-shaped yellowish spot, surrounded with brown, and on the middle of the costa is a similar but larger one. The surface of the wings beneath is grey, mottled with brown.

As a representative of this genus we have figured the following species:—

CALIGO ILIONEUS.

(*Plate XXVIII., Fig.* 2.)

Papilio ilioneus, Cram., Pap. Exot., i., pl. 52 A. (1777).
Morpho ilioneus, Godart, Pap. Exot., ix., p. 448, no. 25 (1823).

This species is very similar to *C. eurylochus*, but has two pale sub-marginal lines on the fore-wings instead of one. The figure will give a fair idea of the general appearance of the upper surface of the most typical species of the genus. It has been drawn of half the natural size. The species is common in South America.

The species of *Eryphanis*, Boisduval, resemble *Caligo*, but are smaller, with shorter and more pointed and angular wings, and especially with smaller eye-spots on the under surface.

SUB-FAMILY IX. SATYRINÆ.

Egg.—About as high as wide, rather small, hard, translucent, smooth, faceted, sub-radiate, or (rarely) ridged.

Larva.—Generally green, with two small horns on the head, and a forked tail; smooth, or slightly hairy; thickest in the middle, and tapering at each end. It feeds on grasses.

Pupa.—Short, cylindrical, not angulated.

1. 2. Erebia ligea. 3. 4. Erebia æthiops.

Schatz and Röber divide the *Satyrinæ* into six principal groups, as follows :—*

A. Lower disco-cellular nervule of the hind-wings rising at or near to the origin of the second median nervule, never from the curve of the third.

i. *Hetæra* group.—Base of the sub-costal nervure of the hind-wings free. Sub-median nervure forked at the base.

Genera: CITHÆRIAS, HETÆRA, PIERELLA, ANTIRRHÆA (aberrant).

ii. *Lethe* group. — Sub-costal nervure of the hind-wings united with the costal nervure at the base, as in all the succeeding groups. Lower disco-cellular nervule as long or longer than the middle one, and forming an acute angle with the median nervure. Costal nervure of the fore-wings well developed, often thickened, but rarely inflated.

Genera: MENÆRIS, LETHE, NEOPE, NEORINA, PARARGE, PTYCHANDRA (aberrant), &c.

iii. *Mycalesis* group.—Lower disco-cellular nervule generally placed between the first and second median nervules at an acute or obtuse angle. Costal nervure of the fore-wings always, and the median and sub-median nervures generally, inflated at the base; but when the two last-named nervures are not inflated, there is always a tuft of hair on the sub-median nervure in the male.

Genera: MYCALESIS AND BICYCLUS.

B. Lower disco-cellular nervule of the fore-wings running to the curve of the third median nervule.

* I have slightly condensed the data, but the names of the most representative genera in each group are given.

iv. *Melanitis* group.—None of the nervures inflated at the base; claws bifid. Lower disco-cellular nervule as long, or longer, than the middle one, and connected with the median nervule at a right angle.

Genera: MELANITIS, GNOPHODES, TISIPHONE, AND CÆROIS (aberrant).

v. *Satyrus* group.—Costal nervure generally, and the median and sub-median nervures less frequently inflated at the base, but sometimes only thickened. Claws simple. Lower disco-cellular nervule of the hind-wings longer, or at least as long as the middle one, and connected with the median nervule at an acute angle.

(This group may be divided by superficial characters into four sections, represented by *Euptychia*, *Ypthima*, *Erebia*, and *Satyrus* [= *Hipparchia*]).

vi. *Pronophila* group.—Costal nervure always inflated; median nervure generally thickened, but not inflated. Middle disco-cellular nervule of the hind-wings always longer than the lower one, waved or angulated, with or without a spur in the discoidal cell. Lower disco-cellular nervule small, straight or curved outwards, and united to the median nervure at a right or at an obtuse angle.

Genera: CALISTO, ELINA, LYMANOPODA, OXEOSCHISTUS, PRONOPHILA, LASIOPHILA, DÆDALMA, CORADES.

It will be most convenient to follow this arrangement, in the main, mentioning the British species and the most important foreign genera, besides those figured under each group. The *Elymniinæ*, which Schatz and Röber regard as aberrant *Satyrinæ*, will be treated as a distinct Sub-family.

I. Hetæra Group.

These are broad-winged Butterflies, peculiar to Tropical America, and measuring from two to three inches across the wings. The genera *Cithærias*, Hübner, and *Hetæra*, Fabricius, include the only transparent-winged species among the *Satyrinæ;* the hind-wings are usually marked with one or two ocelli, and bordered, either with a festooned brown band, or with rose-colour or purple. The other genera, *Pierella* and *Antirrhæa*, Hübner, are opaque, and sometimes sub-caudate; in *Antirrhæa* there are usually rather large sub-marginal spots or eyes. As an example of this group we have figured a species of the

GENUS PIERELLA.

Hætera, sect. 2, *Pierella*, Westwood, Gen. Diurn. Lepid., p. 365 (1851).

Pierella, Butler, Ent. M. Mag., iv., p. 195 (1868); Schatz and Röber, Exot. Schmett., ii., p. 198 (1889).

The type is *Papilio nereis*, Drury, Ill. Exot. Ent., iii., pl. 35, fig. 2, 3 (1782). It is a thinly-scaled brown Butterfly, two and a half inches in expanse, with the outer half of the hind-wings tawny, marked with two eyes, and bordered within with a white band, much expanded in the middle; on the fore-wings is a much narrower oblique band. It is common in South America.

Pierella is the most extensive genus of the exclusively Tropical-American group to which the transparent-winged genera, *Cithærias* and *Hetæra* belong.

The species of *Pierella* measure from two to three inches across the wings, which are broad and rounded, opaque, though sometimes rather thinly scaled, and the hind-wings are nearly as broad as long, more or less quadrate, usually with a slight projection on the hind-margin opposite to the anal angle. The wings are brown, sometimes with a slight

bronzy iridescence, which is frequently noticeable in dark-coloured *Satyrinæ*, and are often banded with white, and varied on the hind-wings, at least, with large patches of white, red, blue, or tawny.

PIERELLA CERYCE.

(*Plate XXXV., Fig.* 1.)

Hætera ceryce, Hewitson, Bolivian Butterflies, p. 10, no. 20 (1874).

Upper side.—Female. — Fore-wings semi-transparent, rufous-brown, crossed by three indistinct short brown bands (two in the cell), and by a longer dark brown band below the middle; three minute sub-apical white spots. Hind-wings rufous, crossed beyond the middle by a band of brown; the outer margin broadly brown, traversed by five white spots, bordered with black.

Under side.—Pale rufous-brown, undulated with dark brown. Both wings crossed by three linear common bands of brown. Fore-wings with a minute black spot near the base, and three minute sub-apical white spots as above. Hind-wings with five sub-apical white spots. Exp., $3\frac{8}{10}$ inches.

The above is adapted from the original description of Hewitson, who considered the species to be probably only a variety of *P. hyceta* (Hew.).

The last-named Butterfly, with which this species is compared, is found in Eastern Peru, and is smaller, with only the first of a row of round black spots which crosses the hind-wings usually within the rufous part, centred with white. *P. ceryce* is a native of Bolivia, and is here figured for the first time.

II. Lethe Group.

This group, as employed by Schatz and Röber, includes a considerable number of genera, mostly East Indian, though one or two have South African representatives, and two genera are

Palæarctic and European. The East Indian species nearly always have the hind-wings angulated, with a more or less distinct tail at the outer angle. One genus, *Ptychandra*, Felder, found in the Philippines, is of a rich blue on the upper side of the male, and another genus, *Cœlites*, Westwood, from the Indo-Malayan Region, has the inner-margin of the hind-wings bordered with blue. The rest are mostly brown, with white or tawny markings; among them is one of the largest of the *Satyrinæ*, viz., *Neorina lowii* (Doubl. and Hew.), from Borneo and Sumatra. This insect measures nearly four inches across the wings, which are dark brown, the fore-wings produced, and the hind-wings with a short thick tail, and a large cream-coloured blotch at the apex of the hind-wings, extending to the adjacent portion of the fore-wings.

Our British species of *Pararge*, though small, and hardly typical of the bulk of the genera placed in this section, must here serve to illustrate it.

GENUS PARARGE.

Pararge, Hübner, Verz. bek. Schmett., p. 59 (1816); Schatz and Röber, Exot. Schmett., ii., p. 202 (1889).

Lasiommata, Westwood, Brit. Butt., p. 65 (1840); id. Gen. Diurn. Lepid., p. 385 (1851).

Type, *P. egeria* (L.).

Eyes hairy, the antennæ gradually formed; palpi with the terminal joint short. Wings with the costal nervure much thickened at the base, the median nervure slightly so, and the hind-margins distinctly denticulated. Colour brown, mostly with tawny or yellowish-white markings; an eye-spot present near the tip of the fore-wings, and a row of sub-apical eyes on the hind-wings.

This genus is confined to the Palæarctic Region, and we have only one species in Britain.

THE SPECKLED WOOD BUTTERFLY, OR WOOD ARGUS. PARARGE EGERIDES.

(*Plate XXXI., Fig.* 3.)

α. *Northern Form.* (*P. egerides.*)

Papilio ægeria (nec L.), Esper, Schmett., i., p. 105, pl. 7, fig. 1 (1777).

Hipparchia ægeria (nec L.), Stephens, Ill. Brit. Ent. Haust., i., p. 54 (1827).

Pararge ægeria, v. *egerides*, Staud., Cat. Lepid. Eur., p. 30, no. 372a (1871).

Satyrus ægeria, var. *egerides*, Kirby, Eur. Butterflies and Moths, p. 39, pl. 12, fig. 10 (1878).

Pararge egeria, var. *egerides*, Lang, Butterflies of Europe, p. 294, pl. 73, fig. 3 (1884).

Lasiommata ægeria, Buckler, Larvæ of Brit. Butterflies and Moths, i., pp. 27, 163, pl. 4. fig. 1 (1886).

Pararge ægeria, Barrett, Lepid. Brit. Isl., i., p. 227, pl. 31 (1893).

β. *Mediterranean Form.* (*P. egeria.*)

Papilio ægeria, Linn., Syst. Nat. (xii.), i. (2), p. 473, no. 88 (1758).

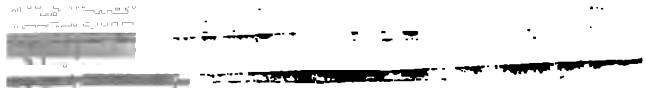
Papilio meone, Cramer, Pap. Exot., iv., pl. 314, figs. E. F. (1780).

Satyrus ægeria, Kirby, *l. s. c.*, p. 39 (1878).

Pararge egeria, Lang, *l. s. c.*, p. 293, pl. 73, fig. 2 (1884).

This is a very common Butterfly in many parts of Britain, frequenting woods, lanes, and hedgerows, from spring to autumn. It expands an inch and three quarters or two inches across the wings, which are brown. The fore-wings have a black eye, with a white pupil near the tip, and their outer half is spotted with pale yellow. The hind-wings are marked with three sub-marginal eyes in pale yellow rings, and there are

1.2. Melanargia galathea.
3. Pararge egerides.
4.5. Epinephile tithonus, male & female.



1.2. Melanargia galathea.
3. Pararge egerides.
4.5. Epinephile tithonus, male & female.

1.2. *Melanargia galathea.*
3. *Pararge egerides.*
4.5. *Epinephile tithonus*, male & female.

three additional pale spots arranged in a triangle near the tip. On the under side the fore-wings are marked nearly as above, but the spots are larger. The hind-wings are varied with grey and purplish, or reddish, and are marked with a rather indistinct row of small reddish-brown eyes, with white pupils. The fringes are pale yellow, interrupted on the nervures.

The larva is green, pubescent, with yellow or whitish lines on the sides. It feeds on various grasses, especially *Triticum repens*, and there is a succession of broods throughout the year.

This Butterfly is generally called *P. egeria* (Linn.) in works on British entomology, but this name properly belongs to the South European form, in which the pale yellow or whitish markings of the northern insect are replaced by rich tawny or fulvous. Lang states that, in some places, *P. egerides* occurs as the spring, and *P. egeria* as the summer, brood.

GENUS SATYRUS.*

Satyrus, Latr., Consid. Gén., p. 355 (1810); id. Encycl. Méth., ix., pp. 11, 480 (1819–23).

Dira, Hübner, Verz. bek. Schmett., p. 60 (1816).

Amecera, Butler, Ann. and Mag. Nat. Hist. (3), xix., p. 162 (1867).

Eyes hairy; antennæ with a distinct pyriform club; palpi with the terminal joint longer than in *Pararge;* wings with the costal nervure much thickened, the median nervure slightly so; hind-margin slightly denticulated. Colour brown; fore-wings more or less filled up with tawny, and having an eye with one or two white pupils at the tip; hind-wings with two or three sub-apical eyes above, and a regular series below.

This is another Palæarctic genus; and species, much resembling the European Wall Browns, *S. megæra* and *S.*

* Pararge, pt. Schatz and Röber, anteà, p. 203.

mœra, are met with as far as the Himalayas. With the exception of *S. megæra*, the species generally frequent rocky places.

As *S. megæra* is called "*Le satyre*" by the old French writers, and was also called *Satyrus* by Linnæus in some of his earlier works, there can be no question that it should be regarded as the type of the genus *Satyrus;* though this generic name was originally used to include the whole Sub-family by Latreille and others.

THE WALL BROWN. SATYRUS MEGÆRA.

(*Plate XXXII., Figs.* 4, 5.)

Papilio megæra, Linn., Syst. Nat. (xii.), i., pt. 2, p. 171, no. 142 (1767); Esper, Schmett., i., pt. 1, p. 96, pl. 6, fig. 3 (1777); i., pt. 2, p. 100, pl. 68, fig. 4 (1781).

Hipparchia megæra, Stephens, Ill., Brit. Ent. Haust., i., p. 55 (1827).

Satyrus megæra, Kirby, Eur. Butterflies and Moths, p. 39, pl. 13, figs. 2, a–c (1878).

Pararge megæra, Lang, Butterflies of Europe, p. 293, pl. 72, fig. 5 (1884); Barrett, Lepid. Brit. Isl., i., p. 234, pl. 32 (1893).

Lasiommata megæra, Buckler, Larvæ of British Butterflies and Moths, p. 165, pl. 4, fig. 2 (1886).

Next to the Meadow Brown, this is probably the commonest species of the Sub-family. It frequents lanes, hedgerows, open places in woods, roads, &c., throughout the summer, and sometimes settles on walls, whence its name. It measures about an inch and a half across the wings. The fore-wings are fulvous, bordered and more or less interlined with brown, and *in the male* there is a broad oblique brown bar towards the inner-margin; at the tip is a black eye, with one white pupil. The hind-wings are brown, with two sub-marginal fulvous streaks,

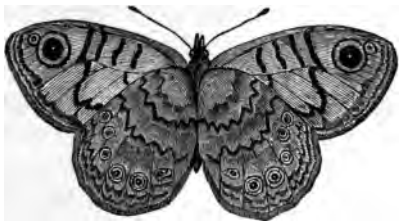
1. 2. *Hipparchia semele*, male & female.
3. " " underside.
4. 5. *Satyrus megæra*.

of which the outer one is the broadest, and contains three black eyes with white pupils, besides a rudimentary one towards the anal angle. On the under side the apical eye of the fore-wings is surrounded by a whitish yellow ring, and the hind-

The Wall Brown (*Satyrus megæra*). Upper side of Female.

wings are brownish-grey, with six small black eyes with white pupils, each enclosed by one brown and one yellowish ring. The eye nearest the anal angle is two-pupilled. Our plate represents the male. The female is figured in the cuts.

The larva is pubescent, light green, with pale dorsal and lateral lines; it feeds on grass.



Under side of Female.

The commonest of the Continental species allied to *S. megæra* is *S. mæra*, but this is a larger and darker insect, with a fulvous blotch on the fore-wings, on which the eye, which

has generally two white pupils, is placed. On the hind-wings there are generally two eyes on the upper side instead of three. Allied species are met with throughout Northern and Central Asia, and southwards as far as the Himalayas.

III. Mycalesis Group.

In this group, Schatz and Röber include *Mycalesis*, Hübner, *Bicyclus*, Kirby, and *Ragadia*, Westwood. *Bicyclus* is West African, and includes a few species, resembling large species of *Mycalesis*, with short, broad, much rounded wings. *Ragadia* is an East Indian genus, containing species under two inches in expanse, which are brown, striped with grey, or with darker brown, and with large sub-marginal eyes beneath, with silvery pupils.

GENUS MYCALESIS.

Mycalesis, Hübner, Verz. bek. Schmett., p. 54 (1816); Westwood, Gen. Diurn. Lepid., p. 392 (1851); Schatz, Exot. Schmett., ii., p. 203 (1889).

The genus *Mycalesis* is confined to the tropics of the Old World, and is very numerous in species. It includes brown Butterflies, averaging about two inches across the wings; and many of the species are more or less tawny or white, especially at the base, but sometimes towards the margins; or the whole of the wings may be white or tawny, except the borders. They may easily be known from any other Butterflies by almost invariably possessing a large black eye in a white or yellow ring, and with a single white pupil, towards the hinder angle of the fore-wings, and usually two or three smaller ones towards the anal angle of the hind-wings. The nervures of the fore-wings are thickened at the base; and there is generally a sub-marginal row of eyes on all the wings beneath. The males are generally provided with glandular pouches, covered with tufts of hair,

on one or both pairs of wings. They have recently been divided into many genera, which, however, are not yet universally recognised by entomologists, and it is therefore unnecessary to notice them further in a work of this description.

MYCALESIS SIMONSII.

(*Plate XXXV., Fig.* 5.)

Mycalesis simonsii, Butler, Ann. and Mag. Nat. Hist. (4), xix., p. 458 (1877).

Wings above sandy-yellow, with a straight, transverse, pale-bordered light brown post-median line across both wings; costal and apical areas of fore-wings reddish-brown, particularly in the female, the base and outer border more or less tinted with the same colour; the margins and a sub-marginal line darker brown; two white-pupilled black ocelli, one small towards the apex, the other large between the first and second median branches; hind-wings with six more or less strongly indicated discal black dots; outer margin reddish-brown. Female with a slender sub-marginal reddish-brown line. Under surface pale rusty-reddish, mottled with ferruginous; the basal area bounded externally by a pale-bordered post-median ferruginous line, deeper in colour than the basal area; a marginal line, and indications of a sub-marginal line, ferruginous; fore-wings with the ocelli less distinct than above, with an additional smaller indistinct ocellus above and below the sub-apical one; hind-wings with an irregular ferruginous line crossing the cell; discal dots more distinct than above, more or less pupillated with white. (*Butler.*)

Expanse of wings, 1 inch, 10 to 11 lines.

Allied to *M. eliasis*, Hewitson.

The types of this species are in the British Museum, and were collected by Mr. F A. A Simons at Lake Nyasa.

IV. Melanitis Group.

A group of small extent, consisting of a few East Indian, African, and American species, measuring three inches and upwards across the wings, which are brown, usually more or less marked with fulvous on the fore-wings at least, and with the hind-margin of the hind-wings nearly rectangular, with a strong projection at the outer angle. *Melanitis leda* (Linn.), and the numerous closely-allied Indian and African forms, usually have two more or less developed ocellated spots near the tip of the fore-wings. Schatz and Röber consider the Tropical American genera of this group somewhat aberrant. The type of one of these, *Tisiphone hercyna*, Hübner, is a black Butterfly, with large white spots on the apical region of the fore-wings, and with the hind-wings but little angulated. Another remarkable genus we have figured, viz.,

GENUS CÆROIS.

Cærois, Hübner, Verz. bek. Schmett., p. 56 (1816); Schatz and Röber, Exot. Schmett., ii., p. 206 (1889).

Cærous, Westwood, Gen. Diurn. Lepid., p. 366 (1851).

CÆROIS CHORINÆUS.

(*Plate XXXVI.*)

Papilio chorinæus, Fabr., Syst. Ent., p. 484, no. 182 (1775); Donov., Nat. Rep., iii., pl. 104 (1825).

Papilio arcesilaus, Sulz., Gesch. Ins., pl. 14, fig. 4 (1776); Cramer, Pap. Exot., iv., pl. 294, A.–D. (1780); Stoll. Suppl. Cramer, pl. vi., figs 1, 1a (1787, transf.).

Satyrus chorinæus, Godart, Enc. Méth., ix., p. 480, no. 10 (1823).

Cærois chorinæus, Staud., Exot. Schmett., i., p. 221, pl. 77 (1887).

Cærois is a small South American genus, and is recognisable

at once by its peculiar shape, which is well shown in our figure of a Surinam specimen of *C. chorinæus*. We have also figured the earlier stages. The Butterfly measures from three to four inches across the wings; the fore-wings are black, and so much produced at the tip so as to be almost hooked; the borders are yellow, and there is a broad yellow band running obliquely from beyond the middle of the costa to the lower part of the hind-margin, and towards the tip is a white spot; the base is brown. The hind-wings are brown, bordered with yellow; they are sub-quadrate, and have a short broad tail projecting outwards from the lower angle of the hind-margin. The male is further remarkable for the extreme atrophy of the front legs, which are reduced to a mere knob, and for two conspicuous tufts of hair on the under surface of the fore-wings, on the inner-margin, and at the hinder angle.

The larva feeds on sugar-cane, and the perfect insect emerges from the chrysalis in about eleven days.

V. Hipparchia Group.

(*Satyrus* group of Schatz and Röber.)

This extensive group includes all the remaining *Satyrinæ*, except those belonging to the *Pronophila* group, which is exclusively Tropical American, and chiefly inhabits the Andes.

The *Hipparchia* group includes, *inter alia*, all the European genera, except *Pararge* and *Satyrus*. Schatz and Röber divide the genera into four sections, as follows:—

1. *Euptychia* section.—Most of the sub-marginal eyes developed. Several longitudinal lines on all the wings. Costal and median nervures of the fore-wings inflated at the base. (N.B.—*Oressinoma* is aberrant.)

2. *Ypthima* section.—Generally with one or two ocellated spots at the apex of the fore-wings, which are frequently united into one large eye with two pupils. Lines on the upper side

wanting. Costal nervure always, and median and sub-median nervures generally, inflated.

3. *Erebia* section.—Always two ocellated spots towards the tip of the fore-wings; others frequently developed, but sometimes obsolete, the front ones often confluent. Costal nervure inflated or thickened, but never the median and sub-median nervures.

4. *Hipparchia* section.—Generally only one eye towards the apex of the fore-wings, but often a second, between the two lower median nervules. Costal nervure inflated, and occasionally the median and sub-median nervures also.

I. Euptychia Section.

With the exception of *Palæonympha*, Butler, which is Chinese, the few genera of this section are all American. The principal genus after *Euptychia* is *Taygetis*, Hübner, which much resembles it, but includes larger species, measuring from two to four inches across the wings. *Oressinoma typhla* (Doubl. and Hew.), mentioned as an aberrant genus of this section, hardly resembles a Satyrid. It expands rather more than an inch and a half, and is white, with brown borders, and short but very broad wings, on the under side is a stone-coloured sub-marginal line, bordered on the outside by an orange one, which is deeply zig-zag on the upper part of the hind-wings.

GENUS EUPTYCHIA.

Euptychia, Hübner, Verz. bek. Schmett., p. 53 (1816); Westwood, Gen. Diurn. Lepid., p. 372 (1851); Butler, P. Z. S., 1866, p. 458; 1867, p. 104; Schatz and Röber, Exot. Schmett., ii., p. 208 (1889).

This is one of the largest genera of the Sub-family. It probably numbers about 200 species at present, and is ex-

clusively American. The species are of rather small size, with hairy eyes, and rounded and slightly dentated wings, and are brown in colour (rarely blue or white), with longitudinal dusky lines, and a sub-marginal row of eyes, these markings being much less conspicuous on the upper surface. The nervures of the fore-wings are much thickened at the base; and the cells of the wings are rather long and broad. *Taygetis*, Hübner, is an allied Tropical American genus, containing much larger species, in which the wing cells are shorter and narrower.

Although *Euptychia* is most numerous in the Tropics, yet several species inhabit the United States, and their metamorphoses have been described by American authors.

EUPTYCHIA BRIXIUS.

(*Plate XXXV., Fig.* 4.)

Satyrus brixius, Godart, Enc. Méth., ix., p. 490, no. 42 (1823).

As this species is but little known, and our figure is not taken from the type specimen, I think it best to insert Godart's diagnosis, and a condensed translation of his original description.

"Sat. alis integris, teneris, cœrulescentibus, strigis utrinque sex fuscis, posticarum quarta subtus ocellis quinque bipupillatis."

This Butterfly measures about an inch and a half across the wings. The upper side is of a bluish-ashy, with six transverse rays, and a double marginal line, of a brownish-black.

On the under side the pattern of the upper surface is reproduced, but the ground-colour is lighter, and the fourth ray of the hind-wings is marked with five eyes, of which the first, the second, and the last are surrounded with a whitish iris; the

This section includes brown, tawny, or whitish spec
small size, which are very numerous in the Palæarctic R
though they are also represented in India, Australia,
and Western North America, &c. They have usually
apical eye on the fore-wings, often double, and a more
well-developed row of sub-marginal eyes on at least the
surface of the hind-wings also. The two most represe
genera are *Vythima* and *Cœnonymphe*, of Hübner. The
do not usually differ much, though in the East Eur
genus *Triphysa* the male is brown and the female white.

GENUS VYTHIMA.

Vythima, Hübner, Verz. bek. Schmett., p. 63 (1816);
Westwood, Gen. Diurn. Lepid., p. 304 (1852); Schat
Röber, Exot. Schmett., ii., p. 210 (1889).

Vythima, Hewitson, Trans. Ent. Soc. Lond. (3), ii., p
(1865).

The type is *V. philomela* (Linn.), a small brown Bu
from the Indian Region.

The species of *Vythima* are small brown Butterflies

1. 2. Epinephile janira.
3. Erebia cassiope.
4. 5. Hipparchia hyperanthus.

and arranged in pairs, and the surface of the wings is covered with short brown and grey dashes. In *Y. ceylonica*, Hewitson, the hind-wings are white. The species are rather numerous in Asia and Africa, but do not quite reach Europe, though one of them, *Y. asterope* (Klug), is found in Syria. They are insects of very feeble flight, frequenting grassy places.

YPTHIMA BERA.

(*Plate XXXV., Fig.* 3.)

Yphthima bera, Hewitson, Ent. M. Mag., xiv., p. 107 (1877).

Upper side.—Rufous-brown. Fore-wings with one ocellus near the apex, with rufous border, and marked by two minute white spots, and enclosed in a large border of pale brown, triangular at its lower extremity, and zig-zag on its inner side. A sub-marginal line of brown. Hind-wings with two ocelli between the median nervules, a rufous border and white pupil; two sub-marginal bands of brown.

Under side.—Fore-wings as above, except that there is an indistinct band of brown crossing the cell. Hind-wings with a band of brown before the middle, a sub-marginal series of five black ocelli, with a rufous border and pupil of white, the whole enclosed by a common linear brown band, the ocellus second from the costal margin smaller than the others.

Expands $1\frac{6}{10}$ inches. (*Hewitson.*)

From Lake Nyasa. There are four specimens in the Hewitson collection in the British Museum. Mr. Trimen describes another South African species of *Ypthima* as having a weak flight, and frequently settling on the ground.

GENUS CŒNONYMPHA.

Cœnonympha, Hübner, Verz. bek. Schmett., p. 65 (1816); Westwood, Gen. Diurn. Lepid., p. 396 (1851); Schatz and Röber, Exot. Schmett., ii., p. 212 (1889).

Type, C. tiphon, Rott.

Eyes naked; antennæ short, slender, ringed with white, with a rather large club; all the principal nervures of the fore-wings considerably dilated.

These are Butterflies of rather small size, with rounded tawny or brown wings, rarely marked with eyes above, except the indication of one at the tip of the fore-wings, but generally with a conspicuous row of eyes on the hind-wings beneath. They are confined to the temperate regions of the Northern Hemisphere, and are mostly heath-frequenting or woodland insects; a few species, however, are found on damp moors. Four species are here included in the British list, one of which however, is not fairly established as really British; and several others have been reputed British, though probably in error. One of these, *C. hero* (Linn.), is a brown species, with numerous and conspicuous black eyes with blue pupils in orange rings, bounded outside on the under side of the hind-wings by a bluish and inside by a white line. It is said to have been taken many years ago in Ashdown Forest, where *C. davus* (*C. typhon*) and *C. arcania* and other rare Butterflies are likewise said to have been found. But there has been no recent confirmation of these captures. One species, *C. californica*, Westwood, is so pale as to be almost whitish.

The Australian genus, *Hypacysta*, Westwood, resembles *Cœnonympha*, but the hind-wings are more produced at the anal angle.

THE MARSH RINGLET. CŒNONYMPHA TIPHON.

(*Plate XXXIV., Figs.* 3, 4.*)

Papilio tiphon, Rott., Naturforscher, vi., p. 15 (1775).
Papilio davus, Fabr., Gen. Ins., p. 259 (1777).

* Wrongly named *C. polydama* in the plate. I followed the nomenclature of the old Naturalist's Library, and did not discover the mistake until the plate had been printed off.—W. F. K.

Papilio typhon, Haworth, Lepid. Brit., p. 16, no. 18 (1803).
Hipparchia iphis, Steph. (nec Den. and Schiff.), Ill. Brit. Ent. Haust., i., p. 64, pl. 7, figs. 1, 2 (1828).
Hipparchia davus, Steph., Ill. Brit. Ent. Haust., i., p. 67 (1828).
Cœnonympha typhon, Kirby, Man. Eur. Butt. p. 70 (1862); id. Eur. Butterflies and Moths, p. 42 (1879).
Cœnonympha tiphon, Lang, Butterflies of Europe, p. 311, pl. 87, figs. 2, 4 (1884).
Cœnonympha davus, Barrett, Lep. of Brit. Isl., i., p. 255, pl. 36, figs. 1, 1, a–g (1893); Buckler, Larvæ of Brit. Butterflies and Moths, i., p. 35, pl. vi., fig. 3 (1886).

Very like *C. pamphilus* (infra, p. 225), but larger; sometimes nearly twice as large. Wings nearly uniform in colour above and below. Fore-wings almost always showing one or two indistinct eyes; hind-wings with at most one or two indistinct eyes near the anal angle. Eyes distinct beneath; fore-wings with one eye at the tip, and rarely one or two smaller ones. Hind-wings grey, with a white transverse band, which is much interrupted, and sometimes reduced to two white spots. Hind-wings with five or six eyes parallel to the hind-margin, the uppermost largest; that nearest the anal angle often double, or represented by two very small eyes close together. The insect varies greatly in the size and number of the eyes.

It appears in June in low-lying meadows, never in gardens, woods, or corn-fields, and is constantly on the wing, very rarely settling. Its flight, however, is slow, and it is easy to capture on the wing. It is fairly common, but not very abundant.

This is Von Rottenburg's account of the occurrence of the Butterfly near Halle in 1776. This insect appears to be identical with *C. davus*, of which Fabricius gives the following account:—

"A Butterfly of moderate size. Fore-wings above rounded,

fulvous [tawny], with two black blind eyes, and a third very small one, which is rather indistinct; beneath with a white stripe, and with two eyes pupilled with white. Hind-wings above darker, with five or six blind eyes; beneath grey, with an interrupted white stripe, and six black eyes with white pupils, the last double. Taken at Hamburg."

We have thought it best to give a full abstract both of Von

Marsh Ringlet (*Cœnonympha tiphon*).

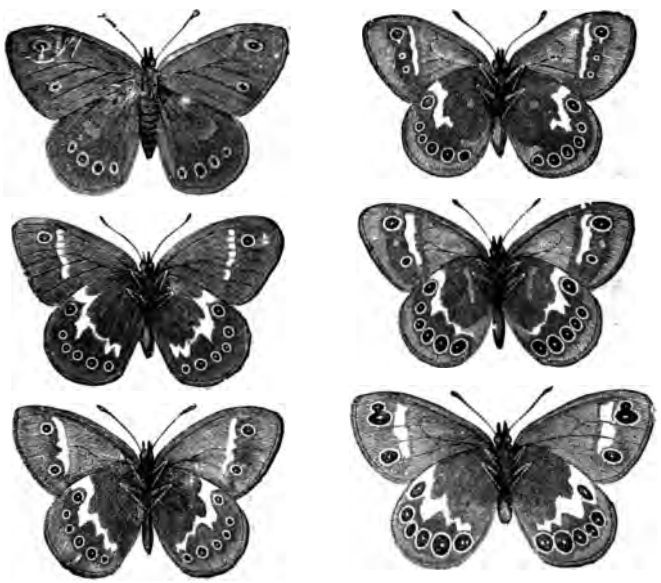
Rottenburg's and of Fabricius' descriptions, because the works in which they were published are not very accessible, and there has been some difference of opinion as to whether we have more than one allied species in Britain, or not. These Butterflies are very variable, and the pale form, the true *C. tiphon*, which is more of a mountain insect with us than *C. polydama*, is more frequently met with in Scotland and Ireland than in England. It appears in July. In the extreme north of Europe we meet with the variety *C. isis* (Thunb.), which is still paler, with the eyes almost wholly wanting. Several varieties are represented in our woodcuts.

The following Butterfly is sometimes called *C. davus* in England, as distinguished from *C. typhon;* but whether it is distinct or not, it is more correct to retain the name under which it was originally described by Haworth.

THE SCARCE MARSH RINGLET. CŒNONYMPHA POLYDAMA.

(*Plate XXXIV., Figs.* 1, 2.)

Papilio polydama, Haworth, Lepid. Brit., p. 16, no. 17 (1803).



Scarce Marsh Ringlet (*Cœnonympha polydama*).

Hipparchia polydama, Steph., Ill. Brit. Ent. Haust., i., p. 66, pl. 7, fig. 3 (1827).

Cœnonympha tiphon, var. *rothliebi*, Staud., Cat. Lepid. Eur., p. 14 (1861).

This species or variety is darker than *C. typhon*, and is marked with much larger and more distinct eye-spots, above and below. It is found in July in low swampy places, in the North of England and Wales, and is said to have been met with here and there along the East coast, in Lincolnshire, Norfolk, &c., but has probably long been exterminated in the South by drainage and cultivation; it may possibly linger in out-of-the-way places like Ashdown Forest, in Sussex, the most southerly locality in England where it has been stated to occur.

The larva is green, with white lines, and feeds on cotton-grass near the roots in May; the pupa is green, with dusky stripes on the wing-cases. Several varieties of the Butterfly are represented in the woodcuts.

CŒNONYMPHA ARCANIA.

Papilio arcania, Linn. Faun. Suec. (ii.), p. 273, no. 1045 (1761).
Papilio arcanius, Linn., Syst. Nat. (xii.), i., pt. 2, p. 791, no. 242 (1767); Esper, Schmett., i., pt. 1, p. 285, pl. 21, fig. 4 (1777).
Hipparchia arcanius, Steph., Ill. Brit. Ent. Haust., i., p. 69 (1828); Curtis, Brit. Ent., v., pl. 205 (1828).
Cœnonympha arcania, Kirby, Eur. Butterflies and Moths, p. 41, pl. 13, figs. 7, a-c (1879); Lang, Butterflies of Europe, p. 306, pl. 75, figs. 4, 5 (1884); Barrett, Lepid. Brit. Isl., i., p. 262 (1893).

This is a Butterfly which cannot easily be mistaken by anyone fortunate enough to meet with it. It measures about an inch and a quarter in expanse. The fore-wings are of a reddish-tawny colour, with a broad brown border, and an apical eye beneath; the hind-wings are brown above and paler beneath,

with a white central band, within which is an eye-spot on the costa; the hind-margin is reddish, with a blue marginal line, and three very small eyes. It is found in bushy places and open woods, and is very common in many parts of the Continent in June and July. In England it is said to have been taken in Ashdown Forest, along with *C. hero*, and although this record is more than doubtful, the Butterfly has been reported to have been met with of late years in various localities in the South of England, and some of the records appear to be trustworthy. There is no reason why it should not be really a British insect, and we have therefore called special attention to it in the present work.

The larva is green, with dark green lines on the back, and yellow stripes on the sides. It feeds on grass in May.

THE SMALL HEATH BUTTERFLY. CŒNONYMPHA PAMPHILUS.

(*Plate XXXIV., Figs.* 5, 6.)

Papilio pamphilus, Linn., Syst. Nat. (x.), i., p. 472, no. 86 (1758); id. Faun. Suec. (ii.), p. 273, no. 1044 (1761); Esper, Schmett., i., pt. 1, p. 282, pl. 21, fig. 3 (1777); i., pt. 2, p. 133, pl. 78, fig. 4 (1782).

Hipparchia pamphilus, Steph., Ill. Brit. Ent. Haust., i., p. 69 (1828).

Cœnonympha pamphilus, Kirby, Eur. Butterflies and Moths, p. 42, pl. 13, fig. 8 (1879); Lang, Butterflies of Europe, p. 310, pl. 77, fig. 5 (1884); Barrett, Lepid. Brit. Isl., p. 263, pl. 36, figs. 2, 2, a–f (1893); Buckler, Larvæ of Brit. Butterflies and Moths, i., p. 172, pl. 6, fig. 4 (1885).

This Butterfly, as its English name denotes, is the smallest of its genus, seldom expanding much more than an inch across the wings. It is tawny, with narrow brown hind-margins, and a brown dot at the tip of the fore-wings, which corresponds to a

well-marked eye with a white pupil and yellow ring on the under surface. The hind-wings beneath are greenish-grey, darkest at the base, with an irregular and interrupted whitish band, and with a few white dots nearer the margins, which, in the South European variety, *C. lyllus* (Esper), a larger form than ours, have a tendency to form eye-spots.

The Small Heath is common throughout the greater part of the Palæarctic Region, on heaths and in meadows, and is the only species of the genus which can be called common in Britain.

The larva is green, with darker dorsal and lateral stripes bordered with white. It feeds on various grasses, and as there is a succession of broods, it may be met with at almost any time between April and September. The pupa is likewise green.

III. Erebia Section.

This section includes the mountain Butterflies of the Northern Hemisphere (*Erebia*, Dalm.), the Himalayas (*Callerebia*, Moore), South Africa (*Leptoneura*, Wallengren), and New Zealand (*Argyrophenga*, Doubl., &c.). The two last genera have longer wings than the others, and the last is ornamented with silvery spots beneath. The only genus which needs further notice here is the following :—

GENUS EREBIA.

Erebia, Dalm., K. Vet. Akad. Handl., Stockholm, 1816, p. 58; Doubl., Gen. Diurn. Lepid., p. 376 (1851).

Maniola, Schrank, Fauna Boica, ii., pt. 1, p. 152 (1801); Meig., Eur. Schmett., i., p. 194 (1829); Kirby, Cat. Diurn. Lepid., p. 57 (1871); Schatz and Röber, Exot. Schmett., ii., p. 213 (1889).

As *Erebia* is the name in general use for these Butterflies, and *E. ligea* (Linn.) is undoubtedly the type, we have pre-

ferred to use this name provisionally in the present work, as the type of *Maniola* (Schrank), is somewhat doubtful; and the latter name may ultimately have to be used for some other genus.

Eyes naked; antennæ slender, with a rather long club. Fore-wings with only the sub-costal nervure much dilated at the base Wings rounded or oval, sometimes slightly dentated, generally brown, with a fulvous (and sometimes macular) sub-marginal band containing black or ocellated spots.

These Butterflies are known as "Mountain Browns," and are very numerous in the mountains of Europe and Asia. As Britain, however, is situated in the north-west of Europe, where Butterflies are less numerous than in any other part, and as our mountain systems are isolated, both from the Alps and the Scandinavian mountains, our highland fauna is very poor.

The only truly mountain Butterfly in Britain is *Erebia cassiope* (Fabr.).

THE ARRAN BROWN. EREBIA LIGEA.

(*Plate XXX., Figs.* 1, 2.)

Papilio ligea, Linn., Syst. Nat. (x.), i., p. 473, no. 97 (1758); id. Faun. Suec. (ii.), p. 473, no. 1050 (1764); Hübner, Eur. Schmett., i., figs. 225–227 (1797 ?).

Papilio alexis, Esper, Schmett., i. pt. 1, p. 369, pl. 44, figs. 1, 2 (1779); i., pt. 2, p. 24, pl. 52, fig. 1 (1780).

Hipparchia ligea, Steph., Ill. Brit. Ent. Haust., i., p. 61, pl. 6 (1829).

Erebia ligea, Kirby, Eur. Butterflies and Moths, p. 36, pl. 12, fig. 8 (1878); Lang, Butterflies of Europe, p. 261, pl. 61, fig. 6; larva, pl. 76, fig. 3 (1884); Barrett, Lepid. of Brit. Isl., i., p. 220 (1893).

This is a species frequenting wooded hill-sides rather than

mountains. It is often found in company with *E. æthiops* on the Continent, but there is no evidence that it is truly British. There are two specimens in the British Museum which belonged to the collection of the late James Francis Stephens, and are named *E. ligea*. They are said to have been taken in the Isle of Arran by Sir Patrick Walker; but one of the specimens is not *E. ligea* at all, but belongs to an allied mountain species, *E. euryale* (Esper), and this throws additional doubt on the authenticity of the specimens. If the Butterfly were really a native of the Isle of Arran, it could not have been overlooked by the many collectors who have visited the island of late years.

The Butterfly is of a rich brown colour, with red marginal bands, marked with four black eyes with white pupils on the fore-wings, and three on the hind-wings. The two eyes nearest the tip of the fore-wings are more or less confluent. The under surface of the hind-wings is marked with an irregular and interrupted white band, at once distinguishing it from nearly all the other known species of the genus. It measures from an inch and a half to an inch and three-quarters across the wings. It flies in July and August.

The larva is green, blackish on the back, and with white longitudinal stripes on the sides. It feeds on grass in spring and autumn.

THE SCOTCH ARGUS. EREBIA ÆTHIOPS.

(*Plate XXX., Figs.* 3, 4.)

Papilio æthiops, Esper, Schmett., i., pt. 1, p. 312, pl. 25, fig. 3 (1777); i., pt. 2, p. 73, pl. 63, fig. 1 (1778?).
Papilio blandina, Fabr., Mant. Ins., ii., p. 41, no. 412 (1787).
Papilio medea, Hübner, Eur. Schmett., i., figs. 220–222 (1797?).

Hipparchia blandina, Steph., Ill. Brit. Ent. Haust., i., p. 62 (1827).

Erebia æthiops, Kirby, Eur. Butterflies and Moths, p. 35, pl. 12, fig. 7 (1878); Lang, Butterflies of Europe, p. 260, pl. 63, fig. 5 (1884).

Erebia blandina, Barrett, Lepid. Brit. Isl., i., p. 216, pl. 29, figs. 2, 2, a–c (1893); Buckler, Larvæ Brit. Butterflies and Moths, i., p. 30, pl. 6, fig. 1 (1886).

Wings dark brown above, with sub-marginal red bands, marked with from three to five eye-spots on the fore-wings, and three (rarely two) on the hind-wings. On the under surface the hind-wings have rather more than the basal half deep fuscous, obsoletely terminating in a sinuated line, and followed by a bluish-ashy fascia, posteriorly tinted with red, in which are one or more very small eye-spots. It measures an inch and a half, or an inch and three-quarters, across the wings.

This Butterfly, though somewhat local, is common in many places in Scotland and the North of England in July and August, extending as far south as Lancashire. On the Continent it is frequently found among wooded hills in company with *E. ligea*.

The larva, which feeds on grass in May, is light green, with brown and white longitudinal stripes; the head is reddish. The egg is ribbed, and is of a whitish colour, speckled with brown.

THE MOUNTAIN RINGLET. EREBIA EPIPHRON.

(*Plate XXXIII., Fig.* 3.*)

Papilio epiphron, Knoch, Beitr. Ins., iii., p. 131, pl. 6, fig. 1 (1783).

Erebia epiphron, Kirby, Eur. Butterflies and Moths, p. 35, pl. 12. fig. 6 (1878); Lang, Butterflies of Europe, p. 241 (1884)

* The race, *E. cassiope*, is here figured.

Var. *Erebia cassiope.*

Papilio cassiope, Fabr., Mant. Ins., ii., p. 42, no. 417 (1787); Hübner, Eur. Schmett., i., figs. 626–629 (1823?).

Hipparchia cassiope, Steph., Ill. Brit. Ent. Haust., i., p. 63, pl. 8 (1828).

Erebia cassiope, Buckler, Larvæ of Brit. Lepid., i., pp. 33, 171, pl. 6, fig. 2 (1886).

Erebia epiphron, var. *cassiope*, Lang, *loc. cit.*, pp. 241, 242, pl. 58, fig. 2; larva, pl. 58, fig. 1 (1884).

Erebia epiphron, Barrett, Lepid. Brit. Isl., p. 210, pl. 29, figs 1, 1a, b (1893).

This is the smallest British species of the genus, generally measuring about an inch and a quarter across the wings. It is brown, with red sub-marginal bands, more or less divided into spots by the veins, and marked with four, or fewer, blind eyes on each wing. In the allied form, *E. epiphron* (Knoch), which many writers consider to be the same species, but which is very doubtfully British, the eyes are ocellated. On the under side of the hind-wings, the red round the eyes, which is often reduced to rings on the upper surface, is wanting.

The Butterfly is found at a considerable elevation on some of the mountains of the Lake District, and those of Scotland and Ireland, in June, but is very local, and not usually very abundant. The larva, which feeds on grass, is pale green, with darker longitudinal lines, and a white line on the sides.

IV. Hipparchia Section.

The species of this section are very numerous throughout the Palæarctic Region, and one or two groups of *Hipparchia* are well represented in the Nearctic Region. Schatz and Röber also refer the Australian genera *Heteronympha*, Wallengren, and *Xenica*, Westwood, to this section, but these are somewhat aber-

rant, being large tawny Butterflies, more resembling true *Satyrus*. In South America the section is very poorly represented, *Argyrophorus argenteus* (Blanchard), from Chili, being the only remarkable species belonging to it.

GENUS HIPPARCHIA.

Hipparchia, Fabr. in Illiger, Mag. Insekt., vi., p. 281 (1807); Steph., Ill. Brit. Ent. Haust., i., p. 53 (1827).

Satyrus, pt. Latr., Enc. Méth., ix., pp. 11, 460 (1819--1823); Westwood, Gen. Diurn. Lepid., p. 388 (1851); Schatz and Röber, Exot. Schmett., ii., p. 215 (1893).

The name *Hipparchia* was used by the older English authors for the whole of the *Satyrinæ*, as was *Satyrus* by the French.

Dr. Scudder argues that *H. hyperanthus* (Linn.) should be regarded as the type of this genus, to which there seems to be no valid objection.

Eyes naked; antennæ gradually thickened, or with a more or less distinct club at the extremity. Wings with the subcostal and median nervures thickened at the base; hind-wings more or less dentated.

This genus includes species of moderate size, from an inch and a half to three inches in expanse. The wings are brown or black, generally with a white or tawny sub-marginal band, extending over more or less of the disc; the fore-wings are almost always marked with a dark eye at the tip, with a white pupil, and another towards the hinder angle, while there is a third smaller eye near the anal angle of the hind-wings. In the males the second eye on the fore-wings is often obsolete on the upper surface, and the pale markings are less extended than in the females, the latter being often considerably larger than their partners.

In another section of the genus the wings are dark brown

or black, with a varying number of sub-marginal eyes, sometimes of considerable size, and marked with blue or white pupils. We have but two species in England, *H. semele* and *H. hyperanthus*, representing the two sections of the genus respectively; but the genus is well represented in Europe and Asia by much larger and handsomer species than ours. One of the finest of the foreign species is *H. parisatis* (Kollar), which is common in Western Asia, as far as the frontiers of India. It is a large brown Butterfly, with a pale blue marginal band on all the wings.

THE GRAYLING. HIPPARCHIA SEMELE.

(*Plate XXXII., Figs.* 1, 2, 3.)

Papilio semele, Linn., Syst. Nat. (x.), i., p. 474, no. 101 (1758); id. Faun. Suec. (ii.), p. 276, no. 1051 (1761); Esper, Schmett., i., p. 114, pl. 8, fig. 1 (1777).

Hipparchia semele, Steph., Ill. Brit. Ent. Haust., i., p. 56 (1827); Kirby, Eur. Butterflies and Moths, p. 29 (1878); Buckler, Larvæ of Brit. Butterflies and Moths, p. 28, pl. 4, fig. 3 (1886).

Satyrus semele, Lang, Butterflies of Europe, p. 277, pl. 67, fig. 4 (1884); Barrett, Lepid. Brit. Isl., i., p. 222, pl. 30 (1893).

The Grayling measures from an inch and three quarters to two inches and three quarters across the wings, which are brown, with tawny bands on the wings, darkest on the outer side. The eyes of the fore-wings are well marked on both sides, and that of the hind-wings is likewise distinct above. The tawny markings of the fore-wings are more or less divided into spots, and, in the male, are confined to the immediate neighbourhood of the eyes. On the under surface, the tawny colouring of the fore-wings extends to the base, being only slightly interrupted by blackish markings; the hind-wings are brown beneath, with an irregular white transverse band.

The Butterfly is found on heaths, especially in rocky and stony places, chiefly on the chalk and limestone. It is very common in many parts of the British Islands, though somewhat local, and is met with in July and August. On the Continent it is widely distributed. It frequently settles on rocks and on the trunks of trees. A very dark local form is found in Madeira.

The larva is light green, with darker longitudinal lines, and brownish legs. It feeds on grass in April and May. The pupa is likewise green.

THE RINGLET. HIPPARCHIA HYPERANTHUS.

(*Plate XXXIII., Figs.* 4, 5.)

Papilio hyperanthus, Linn. Syst. Nat., x., p. 471, no. 85 (1758); id. Faun. Suec. (ii.), p. 273, no. 1043 (1761); Esper, Schmett., i., pt. 1, p. 78, pl. 5, fig. 1 (1777); i., pt. 2, p. 38, pl. 57, figs. 2-4 (1780).

Hipparchia hyperanthus, Steph., Ill. Brit. Ent. Haust., i., p. 60, (1828); Buckler, Larvæ of Brit. Butterflies and Moths, i., p. 170, pl. 5, fig. 3 (1886).

Epinephele hyperanthus, Kirby, Eur. Butterflies and Moths, p. 39, pl. 13, fig. 3 (1878); Lang, Butterflies of Europe, p. 302, pl. 74, fig. 4 (1884); Barrett, Lepid. Brit. Isl., i., p. 231, pl. 35 (1893).

Var. *Hipparchia arete.*

Var. *Papilio arete*, Müll., Faun. Fridr., p. 36, no. 330 (1764).

Papilio polymeda, Hübner, Eur. Schmett., i., fig. 172* (1794?).

Epinephele hyperanthus, var. *arete*, Lang, *loc. cit.*, p. 302, pl. 74, fig. 5 (1884).

This is a smaller Butterfly than the Grayling, measuring about

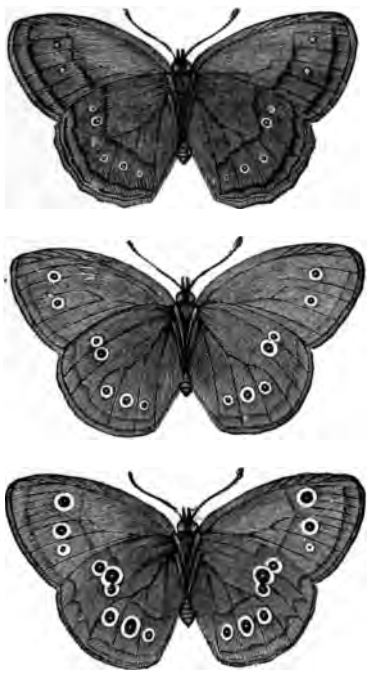
an inch and a half, or an inch and three quarters across the wings. It is of a smoky brown above, with more or less distinct traces of sub-marginal spots in yellow rings. The female is lighter, and with more distinct eyes. The under side is paler,

Hipparchia hyperanthus. Three Varieties of the under side.

with a larger number of spots, which are pupilled with white, and are most numerous on the hind-wings. The number and distinctness of the spots vary very much in different specimens, and in the variety *H. arete* (Müller), the spots are entirely

obsolete, nothing being left of them but the pupils, which form a row of white dots on the under surface of the wings.

The Ringlet is a very common Butterfly in woods, frequenting glades, rides, and the outskirts rather than the thick shade; it appears in June, July, and August.



Hipparchia hyperanthus. Three Varieties of the under side.

The larva is reddish-grey, with a brown line on the back, and a yellowish one on the sides; it feeds on grass in May and June.

A long series of varieties of the under surface are represented in the accompanying woodcuts of the Ringlet.

GENUS EPINEPHELE.

Epinephele, Hübner, Verz. bek. Schmett., p. 59 (1816); Herr.-Schäff., Schmett., Eur., i., p. 81 (1844); Schatz and Röber, Exot. Schmett., ii., p. 216 (1889).

Type, *E. janira* (Linn.).

Eyes naked; antennæ slender, slightly clubbed; wings brown or tawny; fore-wings with two nervures thickened at the base; hind-wings more or less dentated; middle tibiæ a little shorter than the tarsi.

The Butterflies of this genus much resemble *Hipparchia* in structure, but are smaller, weaker, and somewhat differently coloured. They may be divided into two groups, of which our British species, *E. janira* and *E. tithonus*, are typical. They are not very numerous in species, and are most abundant in the Mediterranean Region, and in Western Asia; the group of *E. tithonus* is specially characteristic of South-Western Europe.

THE MEADOW BROWN. EPINEPHELE JANIRA.

(*Plate XXXIII., Figs.* 1. 2.)

α. Female.

Papilio jurtina, Linn., Syst. Nat. (x.), p. 475, no. 104 (1758); id. Faun. Suec. (ii.), p. 276, no. 1052 (1761); Hübner, Eur. Schmett., i., figs. 161, 162 (1794).

β. Male.

Papilio janira, Linn., Syst. Nat. (x.), p. 475, no. 106 (1758); id. Faun. Suec. (ii.), p. 276, no. 1053 (1761); Esper, Schmett., i., pt. 1, p. 128, pl. 10, figs. 1, 2 (1777); i., pt. 2, p. 150, pl. 82, fig. 5 (1783).

Hipparchia janira, Steph., Ill. Brit. Ent. Haust., i., p. 59 (1828); Buckler, Larvæ of Brit. Butterflies and Moths, p. 166, pl. v., fig. 1 (1886).

Epinephele janira, Kirby, Eur. Butterflies and Moths, p. 40, pl. 13, figs. 4a, b (1878); Lang, Butterflies of Europe, p. 298, pl. 73, fig. 3 (1884); Barrett, Lepid. Brit. Isl., i., p. 240, pl. 33 (1893).

The Meadow Brown is probably the very commonest of all our Butterflies, and may be seen in abundance in summer in every field, and along every hedgerow. It measures from an

Meadow Brown (*Epinephele janira*). Under side of Female.

inch and a half to two inches across the wings, which are brown above, with a well-marked black eye with a white pupil at the tip of the fore-wings, within which is a conspicuous ful-

Variety of Male.

vous blotch or band in the female. The fore-wings are fulvous beneath, crossed within the eye by a darker line, continued on the hind-wings which are brown or yellowish-brown, with a

more or less distinct paler band, and two or more brown or yellowish sub-marginal dots.

The South European form, *E. hispulla* (Hübner), is larger and more brightly coloured, the female especially having a sub-marginal fulvous band or patch on the hind-wings above, while the markings below are more pronounced. The more brightly-coloured British specimens often exhibit a slight tendency to variation in this direction.

The larva is light green, with a darker line on the back, and a whitish line on the sides. It feeds on several common grasses, particularly the smooth-stalked meadow-grass (*Poa*

Variety of Female.

pratensis). The pupa is also light green, streaked with brown. The larva, like that of most of the summer *Satyrinæ*, may be looked for in March and April, while the Butterfly begins to appear in the course of June.

Not only is this Butterfly unusually abundant, but its appearance seems to be but little affected by the vicissitudes of the seasons.

The woodcuts represent the under surface of the Butterfly, and instance as well a curious whitish discoloration to which this and many other *Satyrinæ* are occasionally subject, and which is rarely symmetrical on both sides of the wings.

1. *Pierella ceryce.* 2. *Argyrophorus argenteus.*
3. *Ypthima bera.* 4. Eupiychia briximus.
5. *Mycalesis simonsii.*

[illegible]

[illegible]

1. *Pierella coryce.* 2. *Argyrophorus argenteus.*
3. *Ypthima beva.* 4. *Eupiychia briacus.*
5. *Mycalesis simonsii.*

THE LARGE HEATH BUTTERFLY. EPINEPHELE TITHONUS.

(*Plate XXXI., Figs.* 4, 5.)

Papilio tithonus, Linn., Mant. Plant., p. 537 (1771).

Papilio phædra, Esper, Schmett., i., pt. 1, p. 120, pl. 9, fig. 1, p. 323, pl. 28, fig. 3 (1777).

Hipparchia tithonus, Steph., Ill. Brit. Ent. Haust., i., p. 58 (1828); Buckler, Larvæ of Brit. Butterflies and Moths, p. 167, pl. 5, fig. 2 (1886).

Epinephele tithonus, Kirby, Eur. Butterflies and Moths, p. 40, pl. 13, fig. 5 (1878); Lang, Butterflies of Europe, p. 310, pl. 74, fig. 2 (1884); Barrett, Lepid. Brit. Isl., i., p. 245, pl. 34 (1893).

A smaller insect than the Meadow Brown Butterfly, measuring only an inch and a quarter or an inch and a half across

The Large Heath (*Epinephele tithonus*). Under side of Male.

the wings, the female being usually much larger than the male. The fore-wings are fulvous, except the borders, and are marked with a conspicuous black eye with two white pupils; the hind-wings are brown, with a large sub-marginal fulvous band or blotch. In the male the fulvous portion of the wings is darker than in the female, and the lower part is marked by a large brown blotch running up into it. On the under side the fore-wings are coloured nearly as above; the hind-wings are greyish-brown, with an irregular greyish band beyond the middle, marked with three or four white dots in reddish-brown rings.

The Butterfly appears in summer, a little later than *E. janira*, and is not uncommon in bushy places. The larva feeds on the annual meadow-grass (*Poa annua*), and other grasses in May and June. It is of a greenish or grey colour, with a dark dorsal line and two pale lateral lines; the head is reddish.

The woodcut represents the under surface of the male.

GENUS MELANARGIA.

Melanargia, Meigen, Eur. Schmett., i., p. 97 (1829); Kirby, Eur. Butterflies and Moths, p. 36 (1878); Schatz and Röber, Exot. Schmett., ii., p. 216 (1889).

Arge, Hübner (nec Schrank), Verz. bek. Schmett., p. 60 (1816).

Type, *M. galatea*, Linn.

Antennæ long; club slender and gradually formed; hind-wings dentated. Front legs in both sexes almost microscopic, hidden among the hairs of the pectus. Wings varied with creamy-white and black, which often obscures the sub-marginal eyes on the upper surface.

There are several species of this genus in Southern Europe, and Northern and Western Asia, but only one (the type) is met with north of the Alps.

THE MARBLED WHITE. MELANARGIA GALATEA.

(*Plate XXXI., Figs.* 1, 2.)

Papilio galathea, Linn., Syst. Nat. (x.), i., p. 474, no. 99 (1758); Hübn., Eur. Schmett., i., figs. 183–185 (1794 ?).

Hipparchia galathea, Steph., Ill. Brit. Ent. Haust., i., p. 57 (1828).

Melanargia galathea, Kirby, Eur. Butterflies and Moths, p. 37, pl. 12, fig. 9 (1878); Barrett, Lepid. Brit. Isl., i., p. 204, pl. 28 (1893).

Melanargia galatea, Lang, Butterflies of Europe, p. 230, pl. 55, fig. 1; larva and pupa, pl. 76, fig. 1 (1884).
Arge galathea, Buckler, Larva of Brit. Butterflies and Moths, i., p. 160, pl. 3, fig. 4 (1886).

This is a very pretty Butterfly, which can hardly be confounded with any other British species on account of the peculiar character of its markings. Like all the species of its genus, it is varied with creamy-white and black above; on the under surface of the hind-wings it is white in the male and yellow in the female, with a marginal row of black spots, and a transverse grey band across the centre, never interrupted in the middle, as the corresponding band is in some continental species of the genus. It averages about two inches in expanse, the female, as usual, being a little larger than the male. It varies somewhat in the amount of black and white on the wings; and specimens have been met with which were wholly white.

It frequents damp meadows, and glades in woods, in June, July, and August; and it is perhaps owing to drainage that it has become a very local insect in England. In many places on the Continent it is one of the most abundant species of the *Satyrinæ*.

The larva is yellowish-green, with dark lines on the back and sides. The head is reddish-brown, and there are two small spines of the same colour at the hinder extremity of the body. It feeds in April and May on Timothy-grass (*Phlœum pratense*), and other grasses.

The only other genera of this section which need be mentioned here, are *Œneis*, Hübner, = *Chionobas*, Boisd., and *Argyrophorus*, Blanch. The former contains a number of Butterflies resembling small *Hipparchiæ*, but with the costal nervure of the fore-wings thickened (not swollen), a very long narrow fore-wing cell, and very hairy legs and palpi. They vary from pale brown to ochreous or tawny, and are almost

peculiar to the Polar and high Alpine regions of the Northern Hemisphere, though one or two are Steppe insects.

GENUS ARGYROPHORUS.

Argyrophorus, Blanch. in Gay, Hist.Chilena, vii., p. 30 (1852).

THE SILVER BUTTERFLY. ARGYROPHORUS ARGENTEUS.

Argyrophorus argenteus, Blanch., *op. cit.*, p. 30, pl. 2, figs. 9-11 (1852).

(*Plate XXXV., Fig.* 2.)

It is hardly necessary to give any generic characters for this genus, the type of which is one of the most remarkable Butterflies known, being entirely of a silvery lustre above, resembling silver-paper. Towards the tip of the fore-wings is a brownish spot, not ocellated. The under surface of the fore-wings is similar, but is marked with reddish-tawny towards the base; the hind-wings are greyish-brown, with a row of imperfectly ocellated brown spots. It measures about two inches across the wings, and is found in the mountains of Chili. It is not a very common species in collections, owing to its habitat being little visited by entomologists.

VI. Pronophila Group.

These are large, or more rarely, moderate-sized Butterflies, almost entirely confined to the mountainous regions of Tropical America, where they take the place of our *Erebiæ*. They are generally of a black or brown colour, sometimes suffused with red, and often spotted or banded with white, pale yellow, and red. The fore-wings are broad, hardly longer than the hind-wings, with the hind-margin nearly straight, being only slightly curved, and rarely oblique. The hind-wings are generally dentated, sometimes very strongly, and the under surface is more often obscurely marbled than distinctly banded or

Cerois chorinæus.

spotted; there are generally traces of a sub-marginal row of eyes, but these are rarely large or distinct. The principal genera are *Pronophila*, Westwood, *Pedaliodes*, Butler, and *Lymanopoda*, Westwood, but there are several others, all formerly classed under *Pronophila*. The smallest species of the group belong to *Lymanopoda*, and measure about an inch and a half across the wings, which are entire, and more brightly coloured than in most of the other genera, some of the species being white or blue.

Eteona tisiphone (Boisduval) is another species of this group, which is very remarkable for its resemblance to *Archonias*, an aberrant American genus of *Pieridæ*. It measures about two inches across the wings, which are dark brown, short, and dentated, with an oblique row of yellow spots on the fore-wings, and the centre of the hind-wings filled up with a large yellow patch divided into spots by the nervures. It is found in Chili.

SUB-FAMILY X. ELYMNIINÆ.

Egg.—Nearly as wide as high, globular, translucent, hard, obscurely faceted.

Larva.—Smooth, with spines on the head, and a forked tail.

Pupa.—With the head and thorax flattened, and tuberculate.

Imago.—Of moderate size; wings rather broad, and not long; cells closed; base of costal nervure swollen; hind-wings with a pre-costal cell, and the hind-margins dentated or angulated, sometimes sub-caudate. Male with pencils of hair on the hind-wings.

Range.—Indian and Austro-Malayan Regions, as far as New Guinea. Two species are found in West Africa.

1. 2. *Elymnias cottonis.*
3. *Acræa ænone.*
4. *Actinote sodalis.*

Habits.—These insects affect forest country, frequenting damp, weedy places; their flight is slow.

racteristics.—The *Elymniinæ* almost all mimic insects of groups—*Danainæ*, *Acræinæ*, or *Pierinæ*. They usually nd two or three inches across the wings, and may be ished at once from the species which they mimic, by ntated wings. The prevailing colours are dark brown, ta yellowish, or greenish; and the sexes are usually alike. The African species, *Elymnias phegea* d *E. bammakoo* (Westwood), resemble brown or brown and white species of *Planema*. One of mmonest of the East Indian species is *E. undularis* n which the male is dark brown, with a curved row e sub-marginal bluish spots on the fore-wings, and rusty-orders to the hind-wings. The female is reddish-tawny, broad brown borders marked with large white spots, and an oblique white band towards the tip of the fore-wings. It thus becomes one of the numerous mimics of *Limnas chrysippus*, Linn. We have figured *E cottonis* (Hew.) from the Andaman Islands.

The only other genus of this Sub-family is *Dyctis*, Boisd. *D. agondas* (Boisd.) has a dark brown male, and a white, dusky-bordered female. The hind-wings are marked beneath, towards the anal angle, with two or three large oval black spots, within which are blue markings. These are slightly visible on the upper surface also.

Some authors regard the *Elymniinæ* as hardly sufficiently distinct from the *Satyrinæ* to rank as a separate sub-family; but be this as it may, the *Elymniinæ* are almost entirely destitute of the ocellated markings which form so conspicuous a feature in nearly all the true *Satyrinæ*, nor are the latter remarkable for mimicry.

le u

1. 2. *Elymnias cottonis.*
3. *Acræa ænone.*
4. *Actinote sodalis.*

GENUS ELYMNIAS.

Melanitis, pt. Fabr., in Illiger's Mag. Inseckt., vi., p. 282 (1807); Westw., Gen. Diurn. Lepid., p. 403 (1851).

Elymnias, Hübner, Verz. bek. Schmett., p.37 (1816); Wallace, Trans. Ent. Soc. Lond., 1869, p. 321 (Monograph) Schatz, Exot. Schmett., ii., p. 225 (1889).

ELYMNIAS COTTONIS.

(*Plate XXXVII., Figs.* 1, 2.)

Melanitis cottonis, Hewitson, Ann. & Mag. Nat. Hist. (4), vol. 14, p. 358 (1874).

Upper side.—Male.—Dark reddish-brown. Both wings with the outer margins rufous. Anterior wing with the costal margin lilac-blue.

Under side.—As above, undulated with grey, the outer margins broadly undulated with grey and brown. Anterior wing with a large triangular grey spot, undulated with brown, near the apex. Posterior wing with a white spot near the middle of the costal margin.

Female.—Like the male, except that it is much larger and paler, and that the anterior wing has on its upper side some grey spots on the costal margin.

Exp., ♂ $2\frac{1}{2}$; ♀ $3\frac{1}{10}$ inches.

The above is a copy of Hewitson's description. He adds: "I prefer to consider this as a distinct species, rather than to place it as a variety of *M. undularis*. Both sexes are alike, are without spots, and have a broad rufous margin."

The types of this species are in the Hewitson collection in the British Museum, and were received from the Andaman Islands.

ALPHABETICAL INDEX.

Abrota, 129, 149
aceris, Neptis, 146
  Papilio, 146
aceste, Callizona, 122, 123
Acherontia atropos, lxx
achilles, Morpho, 194, 195, 196
  Papilio, 195
acontius, Catonephele, 114
Acræa, lx, 5, 34
  andromache, 34, 37
  encedon, 35
  horta, 34
  oenone, 36
  pasiphäe, 38
  thalia, 39
  violæ, 40
Acronycta tridens, lxxi
Actinote, 33, 38
  amida, 40
  callianira, 40
  griseata, 40
  sodalis, 40
  thalia, 39
adelma, Isodema, 129
Adelpha, lxi, 46, 124, 137, 154, 155
adippe, Argynnis, 58, 59, 60, 62
  Papilio, 58, 60
adonis, Morpho, 195, 196
  Papilio, 195
ægeria, Hipparchia, 208
  Lasiommata, 208
  Papilio, 208
  Pararge, 208
  Satyrus, 208
Ægeriidæ, liv
ægon, Polyommatus, lxviii
ænea, Papilio, 18
æropa, Symphædra, 158
æthiops, Erebia, 228, 229
  Papilio, 228
afer, Papilio, 151
agamemnon, Papilio, lxx
Aganisthus, 46, 158, 175
  odius, 176
agelia, Idea, 15
Ageronia, xliv, lxi, 45, 130, 131, 135
  amphinome, 134
  arethusa,, 134
  chloe, 130
aglaia, Argynnis, 52, 59, 60, 62
  Papilio, 57
agondas, Dyctis, 244
Agrias, lv, lxi, 122, 123, 190
  narcissus, 191
  sardanapalus, 191
Agrotis spina, 20
alcippoides, Limnas, 17
alcippus, Danaus, 18
  Papilio, 17
Aletis, 18
alexis, Papilio, 227
almana, Junonia, 101
amalthea, Anartia, 109
  Papilio, 109
amathea, Papilio, 109
  Vanessa, 109
Amathusia, 198
  phidippus, lxix, 194
Amauris, lx, 121, 126
  dominicanus, 21
  echeria, 22
  niavius, 21
Amecera, 209

amestris, Precis, 103
ammonia, Apatura, 167
amphinome, Ageronia, 134
  Papilio, 134
Amphirene, 124
anacardii, Salamis, 103
Anacardium occidentale, 140
Anæa, lxi, 46, 173, 174, 175
  cyanea, 174
  electra, 174
  panariste, 174
Anartia, 107
  amalthea, 109
Anchura officinalis, 64
andromache, Acræa, 34, 37
Anemeca ehrenbergii, 81
annua, Poa, 238
anomala, Epipyrops, xxvi
Anosia chrysippus, 16
  menippe, 12, 19, 153
antimachus, Drurya, 33
  Papilio, 182
antiochus, Heliconius, 41
antiopa, Papilio, 90
  Vanessa, 90, 92, 96
Antirrhæa, 203
Apatura, xix, lvii, lxi, 5, 44, 46, 159, 160, 168
  ammonia, 167
  bolina xix
  chevana, 168
  clytie, 161
  ilia, 161, 168
  iole, 164, 166
  iris, xix, 161, 163, 164, 165
  namouna, 168
Apaturina erminea, lxi, 170
Apaturinæ, 43, 44, 158
Araschnia, 82
  levana, 82, 83, 84
  porina, 84
  prorsa, 84
arcania, Cœnonympha, 214, 224
  Hipparchia, 224
  Papilio, 224
arcanius, Hipparchia, 224
  Papilio, 224
archidona, Cœnophlebia, 189
archippus, Danais, 12
archippus, Limenitis, 153
  Papilio, 12
Archonias, xlvii, lxi, 243
arete, Hipparchia, 233, 234
  Papilio, 233
arethusa, Ageronia, 134
  Papilio, 134
Arge, 240
  galatea, 241
argenteus, Argyrophorus, 231, 242
Argus, Scotch, 228
  Wood, 208
Argynnis, lviii, 5, 45, 52
  adippe, 58, 59, 60, 62
  aglaia, 52, 57, 60, 62
  charlotta, 58
  childreni, 53
  chlorodippe, 60, 61
  cleodoxa, 60, 61
  eris, 62
  idalia, 53
  inconstans, 18, 53
  lathonia, 60, 63
  maia, 53
  niobe, 61, 62
  niphe, 18, 53
  paphia, 52, 53, 54, 55, 56
  sagana, 53
  valesina, 55
Argyrophenga, 226
Argyrophorus, 241
  argenteus, 231, 242
armandi, Davidina, xlviii
Arran Brown, 227
arsinoe, Cynthia, 50, 51
  Papilio, 50
assimilis, Hestina, 126
astarte, Catagramma, 117, 118, 119
  Papilio, 117
astræa, Ithomia, 32
asterie, Junonia, 101
asterope, Ypthima, 219
atalanta, Papilio, 97
  Pyrameis, 85, 96, 97, 98
  Vanessa, 97
Aterica, 150, 151
  cupavia, 151
  rabena, 150

Athyma, lx, 45, 53, 114, 129, 149, 168
atropos, Acherontia, lxx
australis, Prothoe, 188

bammakoo, Elymnias, 244
Banded Soldier-Butterfly, 117
Barbicornis, 5
Batesia, 135
Beauty, Camberwell, 90
bera, Ypthima, 219
beroe, Papilio, 164
Biblis, 5, 45
biblis, Cethosia, 48
Bicyclus, 203, 212
blandina, Erebia, 229
  Hipparchia, 229
  Papilio, 228
boisduvalli, Pseudacræa, 38
bolina, Apatura, xix
  Hypolimnas, 126
Bombyx waringi, lxx, lxxi
brassicæ, Pieris, xviii, 18
Brassolis, 5, 199
Brenthis, 64
  euphrosyne, 64
  hecate, 64
  selene, 64
  thore, 64
brixius, Euptychia, 217
  Satyrus, 217
Brown, Arran, 227
  Meadow, 236
  Wall, 210
Butterfly, Comma, 87
  Map, 83
  Peacock, 95
  Silver, 242
  Speckled Wood, 208

cadmus, Coea, 176
cœnobita, Catuna, 150
Cærois, 204, 214
  chorinæus, 214, 215
c.-album, Grapta, 87
  Papilio, 87
  Polygonia, 87
  Vanessa, 87, 90
caja, Hypercompa, xxv
californica, Cœnonympha, 220
Caligo, 200
Caligo eurylochus, 200, 201
  ilioneus, 201
Calinaga, 127
Calisto, 204
Callerebia, 226
callianira, Actinote, 40
Callicore, 45, 115, 116
Callidryas scylla, lxiv
Callithea, 45, 121, 122, 131, 137
  sapphira, 121
Callizona, 45
  aceste, 122, 123
calydonia, Prothoe, 188
Camberwell Beauty, 90
camilla, Limenitis, 142, 143, 145, 146
  Papilio, 142, 146
candelarius, Hotinus, xxvi
Caprona, lx
Carcharodus, xlii
cardui, Cynthia, 98
  Papilio, 94, 97
  Pyrameis, 98, 99, 100, 150
  Vanessa, 99
cassiope, Erebia, 229, 230
  Hipparchia, 230
  Papilio, 230
Castalia, 169
Castniidæ, xlvi, 30
Casyapa thrax, lxix, lxxi
Catagramma, lxi, 45, 111, 115
  astarte, 117, 118, 119
  codomannus, 119
  cynosura, 119
  hydaspes, 117
  miles, 119
  pygas, 116, 117
  sinamara, 117, 118
  texa, 119
Catonephele, lxi, 45, 113, 114, 137
  acontius, 114
  obrina, 114
Catuna, 150
  cœnobita, 150
c.-aureum, Polygonia, 86
cenea, Papilio, 17
ceres, Lycorea, 173

ceryce, Hætera, 206
Pierella, 206
Cethosia, xix, lx, lxi, 5, 45, 48
biblis, 48
cyane, 50
cydippe, 48
dido, 47
leschenaulti, 48
mahratta, 49
ceylonica, Ypthima, 219
Chalcosiidæ, 24
Charaxes, xx, xliv, lviii, lx, 5, 44, 46, 130, 177
castor, 182
epijasius, 182
etesipe, 186
ethalion, 174
etheocles, 185
eupale, 178
jasius, 177, 178, 179, 180, 182
tiridates, 184
xiphares, 182, 183
charithonia, Heliconius, 41
Argynnis, 58
charlotta, Papilio, 57
charonda, Euripus, 128
chevana, Apatura, 168
Chersonesia, 140, 141
childreni, Argynnis, 53
Chionobas, 241
chloe, Ageronia, 130
Chlorippe, 168
chlorodippe, Argynnis, 60, 61
Chlosyne, 82
chorinæus, Cærois, 214
Papilio, 214
Satyrus, 214
chrysippus, Anosia, 16
Danais, 16
Danaus, 16
Limnas, 12, 16, 18, 20, 53, 125, 244
Papilio, 16
Salatura, 16
Chrysirdia, lx
circeis, Gnesia, 37
Papilio, 37
Cirrhochroa, 198
Cithærias, 203, 205
cleodoxa, Argynnis, 60, 61
Papilio, 62
Clerome, 197
Clothilda, lxi
clytie, Apatura, 161
Coatlantona, 45
Cœa, 46, 176, 177
cadmus, 176
codomannus, Catagramma, 119
Cœlites, 207
Cœnonympha, 218, 219
arcania, 214
californica, 220
davus, 221
hero, 220, 225
isis, 222
lyllus, 226
pamphilus, 225
polydama, 223
rothliebi, 224
tiphon, 220
typhon, 221, 223, 224
Cœnophlebia archidona, 189
Colænis, 45, 46, 47, 48
dido, 47
Colias, lviii, 5
edusa, lix
electra, lix
hyale, lix
Comma Butterfly, 87
Common Soldier-Butterfly, 116
convolvuli, Sphinx, xxxvi
Corades, lxi, 204
Coryphæola, 107
eurodoce, 107
corus, Euplæa, 23
Papilio, 23
cottonis, Elymnias, 244, 245
Melanitis, 245
Crenis, lx, 111, 112
Ctenandra, 151
opis, 151
cupavia, Aterica, 151
cyane, Cethosia, 50
Papilio, 49
cyanea, Anæa, 174
Paphia, 193
Cybdelis, lxi
cydippe, Cethosia, 48

Cyllo leda, lxxi
Cymothoe, lx, 151
Cyrestis, 45
cynosura, Catagramma, 119
Cynthia, xix, 45, 50
  arsinoe, 50, 51
  cardui, 98
  juliana, 51
  levana, 83
cypris, Morpho, 197
Cyrestis, 46, 140
Cystineura, 45, 136
  dorcas, 136

Dædalma, 204
dædalus, Hamanumida, 150
Damora paulina, 53
Danaidæ, 18
Danainæ, 11
Danais, 5, 18
  archippus, 12
  chrysippus, 16
  genutia, 19
  limniace, 20
  niavia, 21
  plexippus, 12
Danaus, lviii, 18
  alcippus, 18
  chrysippus, 16
  dorippus, 18
  plexippus, 16, 18, 19
Danisepa rhadamanthus, 128
daos, Idea, 15
  Ideopsis, 15
Daptoneura, lxi
Davidina armandi, xlviii
davus, Cœonympha, 221
  Hipparchia, 221
Debis europa, lxix
delius, Hypanartia, 85
Dercas, lx
Deudorix, lx
Diadema, xix, 123
diaphana, Ithomia, 32
  Papilio, 31, 32
Dicorrhagia, 46, 169
  nesimachus, 169
dido, Cethosia, 47
  Colænis, 47
dido, Metamorpha, 47, 124
  Papilio, 47
Didonis, 45, 135, 136
Dilipa morgiana, 170
Dione, lxi, 45, 47, 48
dione, Hypanartia, 85
Dioptidæ, 30
Dira, 209
dirce, Gynæcia, 122
dirtea, Symphædra, 158
Discophora, 198, 199
Dismorphia, lxi, 30
Doleschallia, 108
dominicanus, Amauris, 21
dorcas, Cystineura, 136
dorippus, Danaus, 18
  Euplœa, 17
  Limnas, 17
doris, Heliconius, 43
Doritis, lvii, 5
Dorylus klugii, lxxiv
doto, Ithomia, 31
Doxocopa, 168
Drurya antimachus, lx, 33
drusilla, Limenitis, 144, 146
  Papilio, 146
drymo, Ithomia, 31
Dyctis agondas, 244
Dynamine, lxi, 45, 155
  erchia, 156
  leucothea, 155
Dynastor napoleon, 199

echeria, Amauris, 22
Nebroda, 21, 22
Ectima, 45, 135
edusa, Colias, lix
  Papilio, 94
egea, Polygonia, 86
egeria, Pararga, 208
egerides, Pararge, xviii, 208
  Satyrus, 208
egina, Gnesia, 38
ehrenbergii, Anemæca, 81
elea, Euphædra, 18
electra, Anæa, 174
  Colias, lix
  Sabalassa, 14
eleucha, Marpesia, 137, 138

eliasis, Mycalesis, 213
Elina, 204
elisa, Euplœa, 23
  Macroplæa, 23
Elymnias, 24, 109
  bammakoo, 244
  cottonis, 244, 245
  phegea, 244
  thryallis, 27
  undularis, 244
Elymniinæ, 243
Emperor of Morocco, 163
Emperor, Purple, 163
encedon, Acræa, 35
Enispe, 198
epaphus, Victorina, 124
epijasius, Charaxes, 182
Epicalia, 131, 137
Epinephele, 236
  hispulla, 238
  janira, xviii, 236, 237, 240
  tithonus, xviii, 239
Epiphile, 113
epiphron, Erebia, 229, 230
  Papilio, 229
Epipyrops, xxvi
Epitola, lx
erato, Heliconius, 41, 42
erchia, Dynamine, 156
Erebia, lix, 204, 215, 226
  æthiops, 228, 229
  blandina, 229
  cassiope, 227, 230
  epiphron, 229, 230
  euryale, 228
  ligea, 229, 236, 237
Eresia, 81
Ergolis, 108, 109, 110
eris, Argynnis, 62
erminea, Apaturina, 170
Erycina, 5
Eryphanis, 201
Eteona tisiphone, 243
etesipe, Charaxes, 186
ethalion, Charaxes, 174
etheocles, Charaxes, 185
  Nymphalis, 185
  Papilio, 185, 186
eucrate, Heliconius, 41
Eueides, 42
Eulacura, 169
  osteria, 169
Eunica, 45, 111
Eunica margarita, 112
Euphædra, lx, 46, 152
  elea, 18
  harpalyce, 153
  perseis, 153
  xypete, 153
  zampa, 153
eupale, Charaxes, 178
euphrosyne, Brenthis, 64
Euplœa, xlv, 5, 23
  corus, 23
  dorippus, 17
  elisa, 23
  midamus, lxxi
  papuana, 24
  semicirculus, 24
  usipetes, 24, 27
Euptychia, 202, 204, 215, 216
  brixius, 217
Euralia, 126
Euripus, 45, 127
  charonda, 128
  halitherses, 127
europa, Debis, lxix
eurodoce, Coryphæola, 107
Euryades, lxi
euryale, Erebia, 228
Eurybia, 5
eurylochus, Caligo, 200
  Morpho, 200
  Papilio, 200
Euryphene, lx, 46, 152
Eurytela, 45, 110
  castelnaui, 110
  dryope, 110
  fulgurata, 110
  hiarbas, 110
Euthalia, lx, 45, 150, 157, 158, 169
Euxanthe, lx, 45, 187

fabius, Papilio, 171
  Protogonius, 171
flavescens, Lycorea, 171
flora, Ithomia, 31, 32

flora, Papilio, 32
franckii, Prothoe, 188

galatea, Melanargia, 241
galathea, Arge, 241
  Hipparchia, 240
  Melanargia, 240
  Papilio, 240
genutia, Danais, 19
  Papilio, 19
  Salatura, 19
Geometridæ, xxix
glomeratus, Microgaster, xxvii
Gnesia, 35, 37, 126
  circeis, 37
  egina, 38
  medea, 38
  zetes, 37, 38
Gnophodes, 204
Gordius, xxviii
Grapta, lix, 186
  c.-album, 87
grayi, Sarobia, 27
Grayling, 232
griseata, Actinote, 40
Gryllotalpa, lxxii
Gynæcia, 45, 123, 175
  dirce, 122

Hæmatera, 120
  pyramus, 120
  thisbe, 121
halitherses, Euripus, 127, 128
Hamadryas, 28
Hamanumida, 150
  dædalus, 150
hamata, Tirumala, 20
harpalyce, Euphædra, 153
Hawk-Moth, Spurge, xxxii
Heath Butterfly, Small, 225
Hecaerge, 4
hecate, Brenthis, 64
hecuba, Morpho, 196
Hedysarum medicaginis, 64
Helcyra, 170
helenus, Papilio, lxv
Heliconia, 5, 41
  melpomene, 42
Heliconius, 41, 81
Heliconius, antiochus, 41
  charithonia, 41
  doris, 43
  erato, 41, 42
  eucrate, 41
  melpomene, 42
  ricini, 41
  sylvanus, 43
  vesta, 42
Hepialidæ, xlvi, 129
hero, Cœnonympha, 220, 223
Herona marathus, 129
Hesperia, 5
Hesperilla, lxi
Hesperocharis, lxi
Hestia, 13, 14
  idea, 15
  lyncea, 13, 14
  malabarica, 14
Hestina, 45, 126
  assimilis, 126
  isa, 127
Hetæra, xlii, 202, 203
Heterochroa, 154
Heteronympha, 230
Hipparchia, 5, 204, 215, 216, 231
  ægeria, 208
  arcania, 224
  arcanius, 224
  arete, 233, 234
  blandina, 229
  cassiope, 230
  davus, 221
  galathea, 240
  hyperanthus, xviii, 231, 233, 234, 235
  iphis, 221
  janira, 236
  ligea, 227
  megæra, 210
  pamphilus, 225
  parisatis, 232
  polydama, 223
  semele, 232
  tithonus, 239
hippona, Protogonius, 173
Hirdapa, 24
  rezia, 25
  usipetes, 27

hispulla, Epinephele, 238
horta, Acræa, 34
  Papilio, 34
Hotinus candelarius, xxvi
howqua, Stichophthalma, 197
huntera, Pyrameis, 99
huttoni, Kallima, 106
hyale, Colias, lix
Hyalites, 35
hyceta, Pierella, 206
hydaspes, Catagramma, 117
Hypanartia, 45, 85
  delius, 85
  dione, 85
  lethe, 85
Hypanis, 110
hyperanthus, Epinephele, 233
  Hipparchia, xviii, 231, 233, 234, 235
  Papilio, 233
Hypercompa caja, xxv
Hypermnestra, lvii
Hypna, 46, 175
Hypochrysops, lxi
Hypocysta, 221
Hypolimnas, xix, lx, 24, 45, 123
  bolina, 125
  misippus, 18, 125
  pandarus, 125
  salmacis, 126
hyppocla, Symbrenthia, 85

ichnusa, Vanessa, 90
idalia, Argynnis, 53
Idea, 4
Hestia, 15
agelia, 15
daos, 15
lyncea, 13
  Nectaria, 14
  Papilio, 15
Ideopsis, lx, 15
  daos, 15
Ilerda, lx
ilia, Apatura, 161, 168
ilioneus, Caligo, 201
  Morpho, 201
  Papilio, 201
inconstans, Argynnis, 18, 53
Indian Leaf-Butterfly, 106
indica, Pyrameis, 97
  Papilio, 28, 95
io, Vanessa, 94, 95, 101
iole, Apatura, 164, 166
  Papilio, 164
ionia, Thaleropis, 167
  Vanessa, 167
iphis, Hipparchia, 221
iphita, Precis, lxv, lxvi
iris, Apatura, xx, 161, 163, 164, 165
  Papilio, 163, 164
isa, Hestina, 127
isis, Cœnonympha, 222
Isodema adelma, 129
Ithomia, xlii, 130
  astrea, 32
  dido, 31
  flora, 31, 32
Ithomiinæ, 29, 31
Ituna, 29

j.-album, Vanessa, 90
janira, Epinephele, xviii, 236, 237, 240
  Hipparchia, 236
  Papilio, 236
jasius, Charaxes, 177, 179, 180, 182
  Papilio, 179
jason, Papilio, 179
jucunda, Napeocles, 104
juliana, Cynthia, 51
  Papilio, 51
Junonia, 101
  almana, 101
  asterie, 101
  orthosia, 101
  orithya, lxv

Kallima, xx, lx, 45, 105
  huttoni, 106
kershawi, Pyrameis, 99
klugii, Dorylus, lxxiv
  Limnas, 17

Lachnoptera, lx
Læosopis, lvii

lærtes, Morpho, 197
lamis, Peria, 115
laodamia, Papilio, 134
Large Heath Butterfly, 239
Large Tortoise-shell, 89
Lasiocampa vishnou, lxxi
Lasiommata, 207
  ægeria, 208
  megæra, 210
Lasiophila, 204
lathonia, Argynnis, 63
  Papillo, 63
Leaf-Butterfly, Indian, 106
Lebadea, 148
leda, Cyllo, lxxi
  Melanitis, lxix, 202, 214
Leptocircus, lx
Leptoneura, 226
leschenaulti, Cethosia, 48
Lethe, 203
lethe, Hypanartia, 85
Leucochitonea, lxi
leucothea, Dynamine, 155
levana, Araschnia, 82, 83, 84
  Cynthia, 83
  Papilio, 83
  Vanessa, 83
Libythea, xxxvi, 5
Libythina, xxxvi, 112
ligea, Erebia, 227, 229
  Hipparchia, 227
  Papilio, 227
Limenitis, lvii, lx, 5, 46, 53, 126, 141, 148, 149, 153, 154, 155
  archippus, 153
  camilla, 142, 143, 145, 146
  drusilla, 144, 146
  sibylla, 143, 146
Limnas, 16
  alcippoides, 17
  alcippus, 17
  chrysippus, 12, 16, 18, 20, 53, 125, 244
  dorippus, 17
  klugii, 17
  petilia, 17, 18,
limniace, Danais, 20
  Papilio, 20
  Tirumala, 20
Liphyra, lx
Liptena, lx
lisarda, Penthema, 129
lobengula, Nebroda, 22
lowii, Neorina, 207
lucilla, Papilio, 146
Lycæna, 5
Lycorea, 29, 171
  ceres, 173
  flavescens, 171
lyllus, Cœnonympha, 226
Lymanopoda, lxi, 204, 243
lyncea, Hestia, 13
  Idea, 13
lynceus, Papilio, 13

Macroplœa, 23
  elisa, 23
magellanus, Ornithoptera, lx
mahratta, Cethosia, 49
mæra, Satyrus, 210
maia, Argynnis, 53
malabarica, Hestia, 14
Mandibulata, xxxiv
Maniola, 226, 227
Map Butterfly, 83
marathus. Herona, 129
Marbled White, 240
marcus, Papilio, 195
margarita, Eunica, 112
marica, Papilio, 184
Marpesia, 137, 140
  eleucha, 137, 138
  peleus, 138
Marsh Ringlet, 220
  Scarce, 223
Meadow Brown, 236
Mechanitis, 43
medea, Gnesia, 38
  Papilio, 38, 228
medicaginis, Hedysarum, 64
medoa, Papilio, 38
megæra, Hipparchia, 210
  Lasiommata, 210
  Papilio, 210
  Pararge, 210
  Satyrus, 210
Megalura, lxi, 46, 85
Megistanis, 46, 177

Melanargia, 240
galatea, 240, 241
Melanitis, 30, 204
leda, lxix, 202. 214
Melinæa, 30, 43, 171
Melitæa, 5, 45, 81, 82
melpomene, Heliconia, 42
Heliconius, 41, 42
Papilio, 42
memnon, Papilio, lxxi
Meneris, 203
menippe. Anosia, 12, 19, 153
meone, Papilio, 208
Mesápia, lvii
Metamorpha, 46, 49
dido, 17, 47, 124
Microgaster glomeratus, xxvii
midamus, Euplœa, lxxi
miles, Catagramma, 119
Miresa nitens, lxxii
misippus, Hypolimnas, 18, 126
misoriensis, Hamadryas, 23
Tellervo, 28
Monura, 187
zingha, 187
morgiana, Dilipa, 170
Morphinæ, 43, 193
Morpho, lv, lxi, 5, 194
achilles, 194, 195, 196
adonis, 195, 196
cypris, 197
eurylochus, 200
hecuba, 196
ilioneus, 201
laertes, 197
rhetenor, 196
sulkowskyi, 196
Mountain Browns, 227
Mountain Ringlet, 229
Mourning Cloak, 94
Mycalesis, 203, 212
eliasis, 213
simonsii, 213
Mymaridæ, xix
Myscelia, 45, 113
orsis, 113
Mynes, lxi, 130
Myrina, 5
nais, Symphædra, 157, 158
namouna, Apatura, 168
napoleon, Dynastor, 199
Napeocles jucunda, 104
narcissus, Agrias, 191
Nebroda, 21
echeria, 21, 22
lobengula, 22
Nectaria, 14
idea, 15
Neope, 203
Neorina, 203
lowii, 207
Neotropidæ, 30
Neptis, lviii, lx, 28, 45, 85, 145, 148, 149
aceris, 146
nicomedes, 147
raddei, 147
nereis, Papilio, 205
nesimachus, Dichorragia, 169
Neurosigma sita, 130
niavia, Danais, 21
niavius, Amauris, 21
Papilio, 21
nicomedes, Neptis, 147
niobe, Argynnis, 61, 62
Papilio, 61
niphe. Argynnis, 18, 53
nitens, Miresa, lxxii
Nymphalidæ, 10
Nymphalinæ, 43 44
Nymphalis, 5, 177
etheocles, 185
pygas, 116
tiridates, 184

obrina, Catonephele, 114
occidentale, Anacardium, 140
ochraceus, Protogonius, 173
odius, Aganisthus, 176
Œneis, lvii, lviii, lix, 241
œnone, Acræa, 36
officinalis, Anchura, 64
Ogyris, lxi
opis, Ctenandra, 151
Opsiphanes, 199
orithya, Junonia, lxv
Ornithoptera, lv, lx

Ornithoptera magellanus, lx
remus, lxvi
orsis, Myscelia, 113
orthosia, Junonia, 101
Vanessa, 101
osteria, Eulachura, 169
ovages, Tellervo, 28
Oxeoschistus, 204

Palla, lxi, 186
varanes, 187
pamphilus, Cœnonympha, 225
Hipparchia, 225
Papilio, 225
Panacea, 45, 134
prola 135
panariste, Anæa, 174
pandarus, Hypolimnas, 126
Pandita, 148
Paphia cyanea, 193
paphia, Argynnis, 52, 53, 54, 55
Papilio, 55, 56
Papilio, lvii, lx, lxi, 5
aceris, 146
achilles, 195
adippe, 58, 60
adonis, 195
ægeria, 208
aenea, 18
æthiops, 228
afer, 151
agamemnon, lxx
aglaia, 57
alcippus, 17
alexis, 227
amalthea, 109
antimachus, 182
antiopa, 90
arcania, 224
arcanius, 224
arcesilaus, 214
archippus, 12
atalanta 97
beroe, 164
c.-album, 87
camilla, 142 146
cardui, 94, 98
cassiope, 230
cenea, 17

Papilio, charlotta, 57
chorinæus, 214
chrysippus, 16
cleodoxa, 62
corus, 23
cyane, 49
dido, 47
drusilla, 146
edusa, 94
epiphron, 229
etheocles, 185, 186
eurylochus, 230
galathea, 240
genutia, 19
helenus, lxiv
hyperanthus, 233
idea, 15
ilioneus, 201
io, 28, 95
iole, 164
janira, 236
jason, 179
laodamia, 134
lathonia, 63
levana, 83
ligea, 227
limniace, 20
lucilla, 146
lynceus, 13
marcus, 195
marica, 184
medea, 228
medoa, 38
megæra, 210
melpomene, 41
memnon, lxxi
meone, 208
nereis, 205
niavius, 21
niobe, 61
orithya, 102
pamphilus, 225
pasiphae, 38
penthesilea, 48
petreus, 138
phædra, 239
plexippus, 12
polytes, lxxi
polychlorus, 89

Papilio polydama, 223
porima, 83
prorsa, 83, 143
ridleyanus, 38
semele, 232
sibilla, 143
sibylla, 146
thalia, 39
thetys, 138
thurius, 182
thyestes, 183
tiridates, 184
tithonus, 239
typhon, 221
urticæ, 90
valesina, 55
vulcania, 97
xiphares, 182
papuana, Euplœa, 24
Pararge, 203, 207
ægeria, 208
egeria, 208
egerides, xviii, 208
megæra, 211
Pareba, 35
vesta, 35
Pareute, lxi
parisatis, Hipparchia, 232
Parnassius, xxxi, lvi, 5, 127
Parthenos, 46, 149
Pasha with Two Tails, 179
pasiphae, Acræa, 38
Papilio, 38
paulina, Damora, 53
Peacock Butterfly, 95
Pedaliodes, 243
peleus, Marpesia, 138
Papilio, 138
Penthema lisarda, 129
penthesilea, Papilio, 48
Pentila, lx
Peria lamis, 115
Perisama, 45, 116
Perrhybris, lxi
perseis, Euphædra, 153
petilia, Limnas, 17, 18
petreus, Papilio, 138
phædra, Papilio, 239
Phægorista, 18
phegea, Elymnias, 244
phidippus, Amathusia, lxix, lxxi, 194
Phlæum pratense, 241
Phyciodes, 45, 81
Pierella, 203, 205
ceryce, 206
Pierella hyceta, 206
Pieris, lvii, 5
brassicæ, 18
zarinda, lxv
Planema, 39, 126, 244
plexippus, Danais, 12, 19
Danaus, 16, 18, 19
Papilio, 12, 19
Poa annua, 240
pratensis, 238
polychlorus, Papilio, 89
Vanessa, 87, 88, 89
polydama, Cœnonympha, 223
Hipparchia, 223
Papilio, 223
Polygonia, 86
c.-album, 87
c.-aureum, 86
egea, 86
Polygrapha, 193
polymeda, Papilio, 233
Polyommatus, lviii, 5
ægon, lxviii
polytes, Papilio, lxxi
Pontia, 5
porima, Papilio, 83
Vanessa, 83
pratense, Phlæum, 241
pratensis, Poa, 238
Precis, 45, 101, 102, 103 104
amestris, 103
iphita, lxv, lxvi
rhadama, 103
Prepona, 46, lxi, 191, 192
præneste, 192
præneste, Prepona, 192
Prioneris, xliv, lx
Pronophila, lxi., 204
prola, Panacea, 135
Pronophila, 215, 242, 243
prorsa, Papilio, 83, 143
Vanessa, 83

Prothoe, lxi, 46, 188
australis, 188
calydonia, 188
franckii, 188
Protogonius, 46, 170, 171
fabius 171
hippona, 173
Protogonius, ochraceus, 171
Pseudacræa, lx, 46, 126
boisduvalii, 38
trimeni, 38
Pseudergolis, 104
veda, 104
psi, Acronycta, lxxi
Ptychandra, 202 203, 207
Purple Emperor, 163
Pycina, zomba, 170
pygas, Catagramma, 116, 117
Nymphalis, 116
Pyrameis, 96
atalanta, 85, 96, 97, 98
cardui, 98, 99, 150
huntera, 99
indica, 97
kershawi, 99
virginiensis, 99, 100
vulcania, 97
pyramus, Hæmatera, 120
Papilio, 120
Pyrrhogyra, 124, 136, 137, 155
neæra, 237
tiphus, 137

rabena, Aterica, 150
raddei, Neptis, 147
Ragadia, 212
remus, Ornithoptera, lxvi
repens, Triticum, 209
rezia, Hirdapa, 25
rhadama, Precis, 103
rhadamanthus, Danisepa, 128
rhetenor, Morpho, 196
Rhinopalpa, 104
ricini, Heliconius, 41
ridleyanus, Papilio, 38
Ringlet, 233
Marsh, 220
Mountain, 229
Scarce Marsh, 223
Romaleosoma, 46
rothliebi, Cœnonympha, 224

Sabalassa, 14
electra, 14
sagana, Argynnis, 53
Salamis, lx, 45, 103
anacardii, 103
Salatura chrysippus, 16
genutia, 19
salmacis, Hypolimnas, 126
sapphira, Callithea, 121
sardanapalus, Agrias, 191
Sarobia grayi, 27
Satyre, Le, 210
Satyrus, 5, 204, 209, 231
chorinæus, 214
ægeria, 208
egerides, 208
megæra, 209, 210
mæra, 210
semele, 232
Scarce Marsh Ringlet, 223
Scirpophaga, lxix
Scotch Argus, 228
scylla, Callidryas, lxiv
selene, Brenthis, 64
semele, Hipparchia, 232
Papilio, 232
Satyrus, 232
semicirculus, Euplæa, 24
Sericinus, lvii
sibilla, Papilio, 143
sibylla, Limenitis, 143, 146
Papilio, 146
Siderone, 46, 189
Silver Butterfly, 242
simonsii, Mycalesis, 213
sinamara, Catagramma, 117, 118
siva, Neurosigma, 130
sodalis, Actinote, 40
Soldier-Butterfly, Banded, 117
Common, 116
Small Heath, 225
Small Tortoise-shell, 90
Smerinthus, xxxvi
Smyrna, 45, 123
Speckled Wood Butterfly, 208
Sphinx convolvuli, xxxvi

spina, Agrotis, 20
Spurge Hawk Moth, xxxvi
steneles, Victorina, 124
Stibochiona, 130
Stictophthalma, 197
  howqua, 197
sulkowskyi, Morpho, 196
sulpitia, Victorina, 124
superba, Victorina, 124
sylvanus, Heliconius, 43
Symbrenthia, 84
  hyppocla, 85
Symphædra, 45, 157, 158
  æropa, 158
  dirtea, 158
  nais, 157, 158

Tanaecia, 157, 158, 169
Taygetis, 217
Telchinia, 35
  violæ, 55
Tellervo, 28, 29
  misoriensis, 28
  ovages, 29
  zoilus, 28
Temenis, 45
Tenaris, lx, 194
Tenthredinidæ, xxi
Teracolus, lx
texa, Catagramma, 119
Thais, lvii, 5
Thaleropis, 46, 166
  ionia, 167
thalia, Acræa, 39
  Actinote, 39
  Papilio, 39
Thaumantias, lx, 197
Thestor, lvii
thetys, Papilio, 138
thore, Brenthis, 64
thrax, Casyapa, lxix
thryallis, Elymnias, 27
thysbe, Hæmatera, 121
thurius. Papilio, 182
thyestes, Papilio, 183
Timetes, 137, 140
tiphon, Papilio, 220
  Cœnonympha, 221
tiridates, Charaxes, 184
tiridates, Nymphalis, 184
  Papilio, 184
Tirumala, 20, 127
  hamata, 20
  limniacæ, 20
  limniace, 20
Tisiphone, 204, 214
  hercyna, 214
  Eteona, 243
tithonus, Epinephele, xviii, 236, 239
  Hipparchia, 239
  Papilio, 239
Tortoise-shell, Large, 89
  Small, 90
Trapezites, lxi.
Trauermantel, 94
tricolor, Viola, 64
tridens, Acronycta lxxi
trimeni, Pseudacræa, 38
Triphysa, lvii, 218
Triticum repens, 209
typhon, Cœnonympha, 221, 222, 224
  Papilio, 222

undularis, Elymnias, 224
  Melanitis, 245
Urania, 5, 6
urticæ, Papilio, 90
  Vanessa, xviii, 90
usipetes, Eup'œa, 24, 27
  Hirdapa, 27

valesina, Argynnis, 55
  Papilio, 55
Vanessa. 5, 45, 88
  amalthea, 109
  antiopa, 90, 92, 96
  c.-album, 87, 90
  cardui, 99
  ichnusa, 90
  io, 94, 95, 101
  j.-album. 90
  levana, 83
  polychlorus, 87, 88, 89
  porima, 83
  prorsa, 83
  urticæ, xviii, 90

Vanessa, xanthomelæna, 90
varanes, Palla, 187
vesta, Heliconius, 42
  Pareba, 35
veda, Pseudergolis, 104
Victorina, 45, 137
  epaphus, 124
  steneles, 124
  sulpitia, 124
  superba, 124
Vila, 45, 136
violæ, Acræa, 40
  Telchinia, 35
Viola tricolor, 64
virginiensis, Pyrameis, 99, 100
vishnou, Lasiocampa, lxxi
vulcania, Pyrameis, 97

Wall Brown, 210
waringi, Bombyx, lxx, lxxi
White, Marbled, 240
Wood Argus, 208

xanthomelæna, Vanessa, 90
Xenica, lx, 230
xiphares, Charaxes, 182, 183
  Nymphalis, 183
  Papilio, 182
xypete, Euphædra, 153

Yphthima, 204, 215, 218
Ypthima, 218
  asterope, 219
  bera, 219
  ceylonica, 219

zamba, Pycina, 176
zampa, Euphædra, 153
Zaretes, 189
zarinda, Pieris, lxv
Zegris, lvii
Zeonia, xlii
Zerynthia, 5
zetes, Gnesia, 37, 38
Zeuxidia, 198
Zeuzeridæ, xlvi, liv, 129
zingha, Monura, 187
zoilus, Hamadryas, 23
  Papilio, 28
  Tellervo, 28

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